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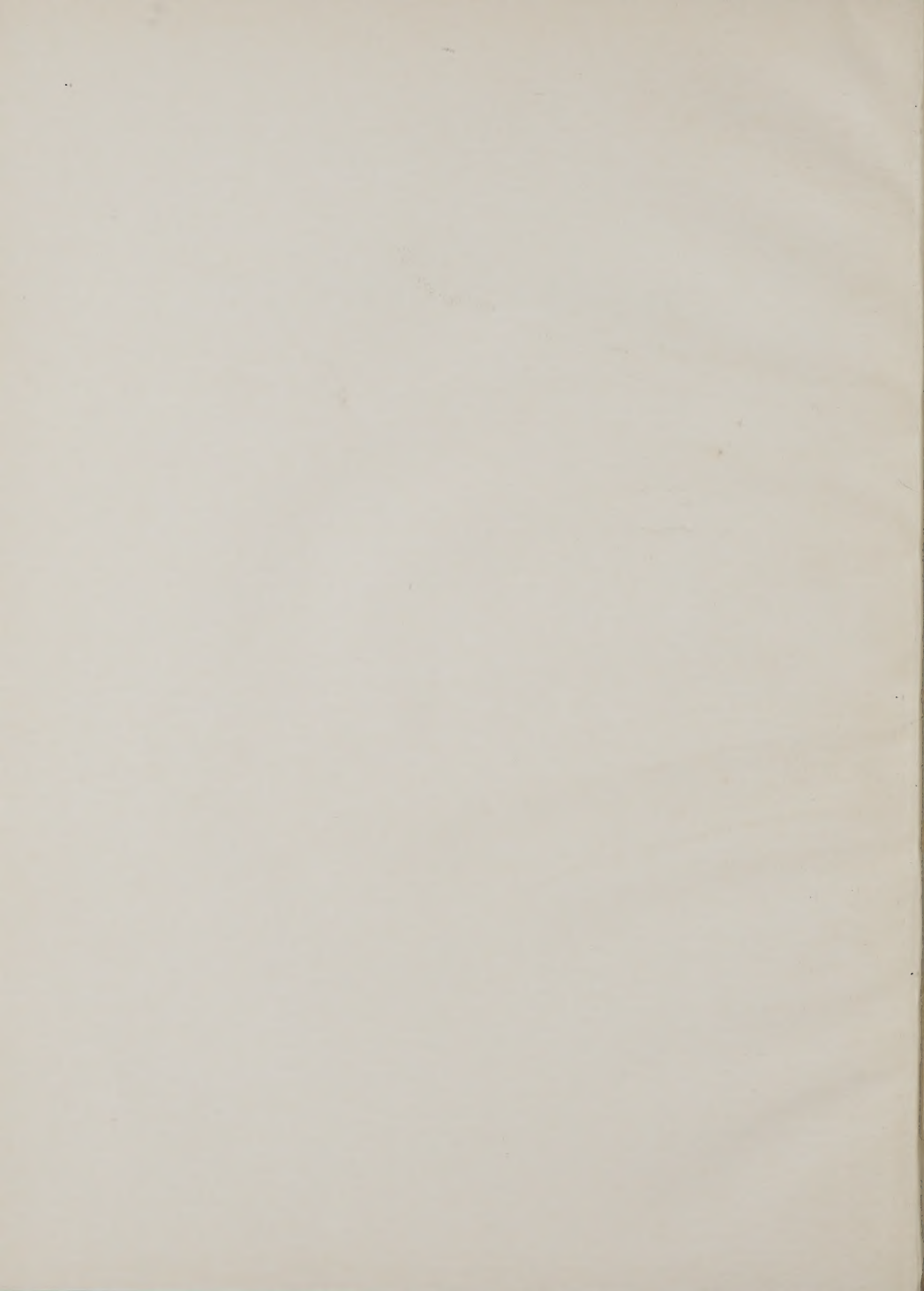
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# THE HAWKER HURRICANE





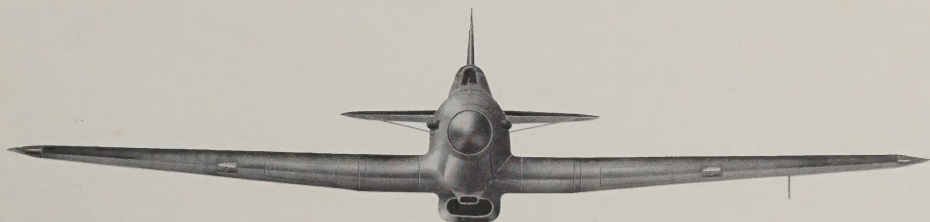


MACDONALD AIRCRAFT MONOGRAPHS

# THE HAWKER HURRICANE

Francis K. MASON

A.R.Ae.S.



DOUBLEDAY & COMPANY, INC.  
GARDEN CITY, NEW YORK

Doubleday edition 1962

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MADE AND PRINTED IN GREAT BRITAIN

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## ACKNOWLEDGEMENTS

In preparing a commentary on one of the greatest fighting aeroplanes flown by the Royal Air Force it is not unnatural that the principal source of reference should be the Air Ministry, and I have no hesitation in saying that without the tireless assistance of Mr. L. A. Jackets and his staff at the Air Historical Branch no book of this sort could possibly be written. I therefore take this opportunity to express my sincere gratitude to them and to Mr. A. J. Charge and to his staff at the Imperial War Museum, the members of which have constantly gone out of their way to assist in the endless search for photographs and other records.

The half-tone black-and-white and coloured drawings are the work of A. E. Freeman, and there can be no doubt that he has produced the most accurate collection of Hurricane drawings ever to have been published.

*Ad hoc* assistance has been embarrassing in its profusion. As always, William Green, John Taylor, Owen Thetford, Bruce Robertson, Bob Shaw, Alec Lumsden and John Blake have time and again come to my rescue. To them I must add my old friend R. C. B. Ashworth and Mr. G. J. R. Skillen of Belfast, both of whom provided valuable information, much of which is unlikely to have appeared before in published form.

To these expert individuals I must record my gratitude, as well as to Hawker Aircraft Ltd for the use of so many photographs. There can be few other manufacturers that have, through the years, so carefully and completely recorded their achievements as the Hawker company, realising as it does

the value of "evidence in camera". To the companies of Rolls-Royce Ltd., the Austin Motor Co., Ltd., the Canadian Car and Foundry Corporation, Avions Fairey of Belgium, Gloster Aircraft Co., Ltd., Flight Re-fuelling Ltd., Short Bros. Ltd., to Comando Geral da Aeronautica Militar of Portugal and to the Officer Commanding, Irish Air Corps, Baldonnell, Eire, I express my thanks.

Lastly there are the hundred and one acquaintances who by some hint, intended or otherwise, have put me on the trail of a useful scrap of information. Their conversations and reminiscences have been a stimulant to the book; *they* know to whom I refer and I thank them.

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The author also wishes to thank the following for supplying photographs: the Admiralty; *The Aeroplane*; the Air Ministry; Flt. Lt. R. C. B. Ashworth; M. J. Bowyer; Comando Geral da Aeronautica Militar, Portugal; *Flight*; L. Graham; William Green; the Imperial War Museum; the Irish Air Corps; Brian Martin; H. G. Martin; G. J. R. Skillen; and J. W. R. Taylor.

## INTRODUCTION

To a sailor his ship assumes a certain personality; he comes to know and respect her, to derive comfort in her strength and protection in times of danger. Thus it is that many a pilot comes to regard his aeroplane, for *this* is his weapon and shield in battle. On his knowledge and skill with his aeroplane will depend his life. Each type of warplane though is as different from the next as it is possible to imagine, for, apart from the function it is designed to perform, each demands singular characteristics from the man or crew whom it takes into battle. In much the same way, the aeroplane itself assumes a character of its own and by this character it is remembered: the Spitfire, with its graceful curves, was perhaps one of the most beautiful warplanes ever conceived. The Hurricane, on the other hand, seemed to emanate a feeling of power, strength and dogged reliability.

Perhaps the most remarkable facet of the Hurricane was that it succeeded at all. That, of course, is not to imply that it suffered more than its share of troubles—rather the contrary. Yet it must be remembered that not only was it the first of the R.A.F.'s new monoplane fighters ordered into massive quantity production after only a single example had flown, but it had been born in the last years of depression, in the face of political apathy and downright opposition to re-armament. And the irony of the situation was that Germany and Britain, entirely unknown to each other were developing fighters to almost identical specifications, almost exactly in step with one another. How nearly the enemy fighter—the Messerschmitt Bf 109—matched the R.A.F. fighters was to become apparent in the Battle of Britain.

One might say that the Hurricane and Spitfire were specifically designed for the Battle of Britain; after all, they were designed for the defence of their country, as had all previous R.A.F. interceptors. The earlier aircraft might well have failed had they been put to the test. *What is important is that the Hurricane and Spitfire did not fail,*

radical though they appeared to be. That is the measure of importance of their place in History, a place second only to the names of their immortal pilots.

What was so special about the Hurricane? A glance at the fighters that it replaced will leave no doubt. For instance, most of the previous generation of biplanes were capable of a top speed of about 250 miles per hour and possessed a two-gun armament. At one stroke the new eight-gun monoplane brought to the R.A.F. a speed of well over 300 miles per hour and was the first R.A.F. fighter to do so. Nor was this advance bought at any great expense; how could it when the entire Air Estimates for 1934 were running at an annual rate of no more than fifteen million pounds? It is unlikely that the cost of the whole Hurricane development programme exceeded fifty thousand pounds, and the cost of a production machine was between six and seven thousand pounds.

It may be to the very fact that military expenditure in Britain was running in low gear that the Hurricane owed its inception. The method employed by the Air Ministry to acquire new fighter equipment had, over the years, been to issue to the industry invitations to tender designs to competitive specifications. There would be delay while companies were shortlisted and further delays while prototypes were built. Then followed competitive evaluation trials and eventually a production contract awarded for the winner. Such a procedure was perhaps tolerable in times of political calm though it is difficult to recognise any economic justification, having regard to the enormous number of prototypes built and scarcity of contracts issued between 1920 and 1933.

The issue of Air Ministry Specification F.7/30 in 1930 was intended as an antidote to the apparent technical stalemate, but realisation came suddenly that military requirements had overtaken the biplane's capabilities. Thus the only course open to the Air Staff was to invest responsibility for a

major technical advance in the aircraft industry itself. With world re-armament looming large, no longer was there time to engage in the traditional lengthy competitions; the new Specifications were written around the Industry's own proposals. Thus were born the Hurricane and Spitfire, the former the logical application of a company's well-tried system of construction and the latter the outcome of another company's experience in high-performance racing seaplanes.

To many the Hawker Hurricane now exists merely as a sentimental relic of the past—to some

the memory of a weapon with which they waged war many years ago; to so many others a symbol of that twilight period while Britain sought to prepare herself for the inevitable dark years of struggle with the Axis powers. For the Hurricane and the Spitfire were the principal weapons on which Britain pinned her hopes to guard against an attack by a country already committed to a campaign for domination of Europe. This book seeks to recount the motives which activated the Hurricane, outline its early development and follow its fortunes in the tablets of History.

## Chapter 1

# THE BACKGROUND TO BRITISH FIGHTER REQUIREMENTS BETWEEN THE WORLD WARS

Hurricane and Spitfire—names which have attained an undying place in History and which were on the tongues of millions the world over during those fateful months of 1940. The skill of their pilots dictated the destiny of the Democratic World no less than that of Britain, that stubborn bulwark that frustrated the territorial ambitions of the hitherto invincible Third *Reich*.

These aeroplanes were the principal weapons in the air arsenal of a country whose leaders had been content too long to bask in the insular belief that a twenty-mile stretch of water still constituted an impenetrable barrier to the products of modern technology. Yet both fighters were the results of carefully evolved technical logic in the face of an almost traditional apathy, and were brought to fruition by the combined efforts of an industry and a fighting service made painfully aware that world events were moving swiftly towards a crisis that might find Britain fatally vulnerable.

It is therefore necessary, in order to understand how and why the Hurricane came to be evolved, to go back some years before 1933—the year its design was initiated—to study the age-old prejudices and official policies which formed the background to British fighter requirements.

To begin with, in the broad field of military planning during the nineteen twenties, war was unlikely in Europe without some considerable period of warning during which any dangerous symptoms could be examined and politically isolated. Germany constituted a danger more to herself than to her neighbours and was forbidden to maintain armed forces. France was undoubtedly the strongest country in terms of manpower, though the quality of her equipment left something to be desired. Any possible threat to Great Britain was assumed to be that of the heavy bomber and, since no such threat could be recog-

nised, this country was content to relax under the auspices of the Ten Year Rule—a belief that ten years' warning of another war would provide sufficient time to gear Britain to a state of adequate preparedness.

Nevertheless, despite the supposed immunity from major crises at home, Britain's overseas commitments continued in their traditional demands for military attention. In particular the assumption of military control in Iraq by the Royal Air Force in 1922 and the recurring troubles in the North West Frontier Province provided excuses for the continued existence of Britain's youngest fighting service. Such limited responsibilities as these, however, were quite insufficient to warrant complicated and expensive development of the R.A.F.'s equipment, and the Air Staff seemed to favour successive generations of "general purpose" and army co-operation aircraft throughout the 'twenties and early 'thirties.

Development of interceptor fighters was almost entirely ignored after the First World War, and as late as 1922 the air defence of the country rested on a single squadron of five-year-old Sopwith Snipes. That is not to say that experience was lacking in the aircraft industry, for a number of Air Ministry requirements was issued each year for fighters, and progress was maintained by the many experimental prototypes which resulted.

Notwithstanding, progress was perforce slow and limited, and not entirely for technical reasons. The fundamental cause, it is true, was an age-old prejudice held by successive Air Staffs against the monoplane fighter. Following a series of fatal accidents to monoplanes *before the First World War*, a feeling that sufficient structural integrity could only be established at a prohibitive weight penalty continued to be held. This view has evoked criticism and ridicule ever since, and is

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generally recognised as having compromised fighter development for many years. In fairness, there was little evidence that the monoplane's protagonists could offer during the 'twenties that the monoplane could be a trustworthy high speed combat aircraft. It was acknowledged that such machines as the Schneider Trophy designs were adopting the monoplane layout, but their critics could illustrate their arguments with many accidents which were generally held to have been caused as a result of some structural failure of the wing.

Furthermore, with expenditure on the Royal Air Force running at an annual level of less than ten million pounds—and considerably less than this sum available for aircraft research and procurement—there was simply no question of initiating a long and costly research programme to develop the small monoplane fighter. Nor, up to 1930, was there any reason to believe that the traditional biplane fighter, with its standard two-gun armament, could not cope with any known bomber threat against the territories defended by the R.A.F.

While the international situation was apparently settled, the Air Staff lacked any yardstick from abroad by which to estimate the likely efficiency of its equipment, and it was perhaps natural that the measure of confidence held in the air defences should be derived from the annual exercises and

the performance of its own bomber forces.

Then occurred, early in 1930, an event destined to bring about an end to the enforced complacency with regard to fighter requirements. This was the advent of the Hart bomber, and it is proposed to show that this brought about the train of events which ultimately led to the introduction of the Hurricane and Spitfire.

It would, of course, be ridiculous to suppose that the Air Staff was unaware of the imminence of the introduction of the Hart, for this aircraft had been under development by the Hawker Company since 1926—the outcome of a Specification issued at the Air Ministry that year. The fact is that the air defence exercises of 1930 provided a practical demonstration that no R.A.F. interceptors possessed a performance equal to the new bombers; indeed the state of affairs that now existed had been anticipated a year or so earlier by Sydney Camm—Chief Designer of H. G. Hawker Engineering Co., Ltd.—when he initiated the development of the Hornet (later known as the Fury) as a Private Venture. The Air Ministry, now painfully aware of the Hart's immunity from interception, eagerly adopted the Hornet and quickly issued a Service Standard of Preparation and production contract.

However the writing had been on the wall ever since the Hart had completed its initial trials in 1929 and the Hornet/Fury fighter, with a speed

*A Hawker Hart day bomber. The advent of this aircraft brought realisation of the deficiencies in Britain's fighter forces in 1930.*





*Hawker Fury interceptor fighters of No. 1 (Fighter) Squadron.*

margin of some twenty miles an hour over the Hart, could be regarded as little more than a stopgap. (As has been so often shown such "interim" designs have tended to linger in service rather longer than originally planned; Furies continued to serve as front line fighters until 1939.)

So it was that at the beginning of 1930 Air Chief Marshal Sir John Salmond, who had previously served as Air Officer Commanding, Air Defences of Great Britain, was appointed Chief of the Air Staff, and it was under his energetic offices that stimulus was added to the pressing need to develop a new generation of interceptors. At that time home defence squadrons were equipped with Armstrong Whitworth Siskin IIIA's (top speed 156 m.p.h.), Bristol Bulldogs (top speed 174 m.p.h.) and Gloster Gamecocks (top speed 155 m.p.h.), whereas day bomber squadrons were shortly to receive the first of the new Hawker Harts whose top speed of 184 m.p.h. was likely to render interception impossible; in those days before radar, information as to enemy formations' whereabouts was likely to be most inaccurate and was entirely based on ground visual sightings. During exercises it was customary for ground observers to fire coloured lights on the approach of "enemy" forces in case defending fighters were in the neighbourhood. It needed no sliderule to show that under these conditions any combat which resulted in a stern chase was utterly futile; moreover, should any fighter be so lucky as to achieve a perfect quarter attack having lain in the path of the oncoming bombers, such was the

speed margin possessed by the new bombers that only a fleeting burst from the fighter's twin synchronised rifle-calibre Vickers guns could be possible.

Without waiting for the introduction of the Hart into squadron service (since initial service trials at Martlesham Heath with many prototypes during recent months had already confirmed the problems), the Directorate of Technical Development at the Air Ministry applied itself to the task of setting down the problems facing the fighter squadrons and indicating the most important aspects in which the design of the interceptor must advance. The first priority was naturally the perennial demand for greater speed—a demand by now almost certain to be satisfied with the introduction of the relatively new Rolls-Royce Kestrel in-line engine, being demonstrated in the Hornet prototype—and the Hart.

Additionally, the most important specific design feature now advocated was an increased armament, for realisation came that as fighter and bomber speeds increased, so the time that sights could be held to bear would become progressively shorter. Unfortunately this stipulation posed several not inconsiderable design problems, for only one gun suitable for fixed mounting, the old Vickers .303-inch gun, was available in this country. True the Vickers Mark II had a relatively high rate of fire of about 1,000 rounds per minute, yet the age-old fault of double-feed jams demanded that the breech mechanism should be accessible to the pilot in flight, or at least that the

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*The Hart engine test bed, K1102, with evaporative-cooled Kestrel engine. The strip condensers may be seen on the leading edges of the wings.*

cocking handles should be within reach. Moreover at least 500 rounds per gun—a standard requirement in those days—precluded ammunition stowage anywhere but in the fuselage, in turn necessitating interrupter gear to give clearance of the propeller blades. At least one manufacturer studied the possibility of reverting to the practice, in vogue during the First World War, of providing the pilot with a pair of Lewis guns on flexible mountings, but the task of replacing the 97-round magazine drums posed too great a difficulty at speeds of about 200 miles per hour.

Thus was born Air Ministry Specification F.7/30, probably the most controversial requirement ever issued. It demanded improvements in every facet of fighter design—greater speed, greater ceiling, faster climb, greater manoeuvrability and greater firepower. Furthermore, while it was realised that the cost would represent a considerable increase over that of current fighters, the new machine was to be a night fighter as well as a day interceptor in order to eliminate the need for a second specialised design. Implicit in this night fighting capability was ease of landing, low wing loading and freedom from exhaust glare for the pilot. A top speed of no less than 250 miles per hour was optimistically sought.

In return for this aircraft, which it was confidently expected would put Britain's fighter force

ahead of the World, the Air Ministry offered production contracts that were huge by any peacetime standard. Few firms in the aircraft industry failed to recognise the enormous prize at stake, with the result that considerable efforts in research were made at private expense and complicated programmes undertaken to evolve means by which the Specification could be met.

The Specification in its initial form was finally issued towards the end of 1930 and the date for evaluation of prototypes at Martlesham Heath was set for the Summer of 1932. It became, however, progressively more obvious that no powerplant yet existed which would enable the performance to be achieved and evaluation was put back, first one year and later two years, to 1934.

We must now turn briefly to the progress being made by British aero-engine manufacturers. As already stated, the Rolls-Royce Kestrel, developing in its early forms about 500 brake horse power, had brought transformation to combat aircraft design and performance, and was largely responsible for the advances made by the Hart and Fury designs. That is not to say that some radials did not hold promise, for had early troubles with the Bristol Mercury been surmounted sooner the superiority of the in-line engines in the nineteen thirties might have been

(Top) One of the Rolls-Royce P.V. 12-powered Hawker Horsley engine test beds. (Lower) The Hawker Hart, K3036, P.V.12 test bed. The ventral radiator system was similar in concept to that on the Hurricane.

more seriously contested. But it is the development of the Rolls-Royce engines which must hold our attention, for they were to foster the famous Merlin engine that was to take the Hurricane and Spitfire into those summer skies of 1940.

In 1930 Rolls-Royce Ltd. embarked on a scheme to adapt the Kestrel to a system of steam evaporative cooling by employing strip condensers in a conveniently exposed part of the aircraft structure. A Hart was ordered from the Hawker Company and this machine was delivered before the end of the year. It featured condensers along the entire span of both upper and lower wing leading edges. Development of the installation continued for many months (during which the pilot had to be provided with a cockpit enclosure to protect him from the shower of supercooled water droplets which were discharged from the centreline condensers). Simultaneous changes



*The Rolls-Royce Merlin certification flight; right to left: Hart K3036, Hart K2969, High-Speed Fury K3586, Heinkel He 70, Horsley and Battle.*



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in the Kestrel itself, principally to the supercharger, together with the steam cooling scheme resulted in a new name—the Goshawk—being bestowed and it was this engine which found favour among many of the contenders for F.7/30.

The fact that the terms of F.7/30 were modified from time to time, resulting in lengthy delays with the various prototypes, was perhaps little more than of academic significance for already world events as well as technical progress in other aspects of aircraft design were conspiring to outdate the apparently farsighted provisions of the 1930 deliberations. However, a short survey of the prototypes tendered for evaluation may serve to indicate the measure of effort evoked in the industry and thus illustrate the reasoning behind the radical features which were to characterise the new generation of interceptor monoplanes.

To begin with, there was the entirely orthodox approach favoured principally by George Carter of the Gloster Aircraft Company, and by Sydney Camm. The former was already developing the Gauntlet which, despite two-bay wings and radial engine, possessed a maximum speed of 230 miles per hour and was scheduled for quantity production. The Gloster design team therefore was committed to a design accepted by the R.A.F. and was not initially inclined to tender a prototype in the F.7/30 "rat race". It transpired, however, that a refined version of the Gauntlet, undertaken as a Private Venture to meet F.7/30, came to be built

and evaluated; so successful was this—the Gladiator—that production contracts were issued in 1935. While it was adjudged the winner of the competition and in fact satisfied all the requirements, events in the meantime had precluded the chance of production quantities of the magnitude promised back in 1930. In all, just over 200 Gladiators were delivered to the R.A.F.

Hawkers also prepared a biplane tender to F.7/30. This, the P.V.3, was a development of the Fury but employed a Goshawk engine with wing condensers and was armed with four Vickers guns in the nose. Spatted wheels added an air of refinement to what has been called the most beautiful Fury. Considerable flight test work had been undertaken by Hawkers with trial installations of many of the P.V.3's features: The undercarriage had been flown on the Intermediate Fury *G-ABSE*, the engine installation was tested in the High Speed Fury *K3586*, while the exhaust stubs (known as Rams Horn manifolds) were flown on several aircraft as means to diffuse the exhaust flames at night. The P.V.3 was credited during evaluation in 1935 with a top speed of 224 m.p.h. with Goshawk engine, although during 1934 a Kestrel Special had been fitted temporarily. By the time of the evaluation, however, the Goshawk with its complicated and vulnerable steam cooling had been dropped from official favour, and already a more conventional development of the Kestrel—the P.V.12—was undergoing

*Hawkers' contender for the F.7/30 Specification: The four-gun Goshawk-powered P.V.3 day and night fighter.*



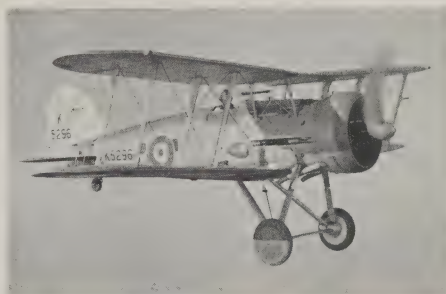
initial trials by Rolls-Royce Ltd., at Hucknall.

Whereas the Bristol Aeroplane Company built two F.7/30 monoplane prototypes (Types 123 and 133) displaying relatively conventional appearance, among the unbuilt project studies of the Bristol Company was a monoplane (Type 129) powered by a pusher Mercury, a resort intended to facilitate installation of uninterrupted armament. But certainly the most ingenious design was the Westland tender. Originating as a monoplane, the aircraft came to be built as a biplane with inverted gull top wing. The Goshawk (this time employing either conventional water or steam cooling) was mounted amidships aft of the cockpit and drove the airscrew through a shaft below the pilot. Four Vickers guns were installed in the sides of the fuselage beside the cockpit. The pilot was, thanks to a lofty position above and forward of the top wing, afforded a superlative field of view. Nevertheless the price of ingenuity was performance and the Westland machine could never have been seriously considered with its maximum speed of 185 m.p.h.

The most direct and significant end product of the F.7/30 venture was R. J. Mitchell's Goshawk-powered Supermarine Type 224 monoplane which, although not accepted for production, formed an essential link between the successful Schneider Trophy racing seaplanes and the Spitfire. As a design it was inauspicious in itself, with its gull wing, fixed trousered undercarriage and top speed of 230 m.p.h., but it provided the Supermarine design team with invaluable experience in a searching military competition.

Other prototypes were also prepared but none was to influence the trends of fighter design which, in 1933 and 1934, were taking shape in the minds of Camm and Mitchell. We have seen that the Air Ministry and industry alike were searching—with limited success—for the formula which would break the deadlock of technical stalemate.

Perhaps the reason for this stalemate could be found in an outdated system of aircraft procurement, for no body existed to advise the Air Ministry on the state of research in the industry or to co-ordinate efforts in the industry to meet demands economically. We have seen in the experience of Specification F.7/30 that delays and changes in Air Ministry requirements so confused the ultimate designs that no pattern of fighter progress resulted. No Ministry of Supply then existed (one was proposed in 1937 but was refused by Prime Minister Neville Chamberlain in the House of Commons) and results of research conducted at the Royal Aircraft Establish-



*Some R.A.F. fighters of the 'thirties: top, the Bristol Bulldog; centre, the Gloster Gauntlet; bottom, the Gloster Gladiator (prototype shown).*

ment, Farnborough, did not enjoy the wide circulation they might have, on grounds of commercial integrity. The same reason was given to prevent distribution of information on Service trials at the Aircraft and Armament Experimental Establishment at Martlesham Heath, unless it was to a firm whose aircraft was on trial. Perhaps the Air Staff felt that large numbers of prototypes (whose cost was small compared with that of production contracts) and a Service evaluation to decide the most suitable, was the

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safest and simplest means of getting the best from the industry.

It can therefore be seen that the process of acquiring aircraft depended almost entirely on direct contact between the Air Ministry (principally through the Directorate of Technical Development) and the professional technicians in the industry. Contractual liaison was maintained on normal commercial lines, dictated on the one hand by the Treasury and by industrial management on the other, while the interests of the industry were theoretically protected by the Society of British Aircraft Constructors.

What of the political scene? What powers of persuasion could be brought on the Treasury to justify expenditure on radical military aircraft at a time when the nearest war was in China, and the world was in the throes of economic depression? Certainly the aircraft appropriation section of the annual Air Estimates would, at the figure of six million pounds, hardly stand the expense of total re-equipment of the R.A.F.

Yet, in 1933, political exasperation in Germany accompanied by Hitler's solution to a quest for national equality of rights brought about that country's withdrawal from the Disarmament Conference and League of Nations on 14th October. Ten days later the House of Commons listened to the sonorous tones of the Hon. Member for Epping announce "... Germany is already well on her way to become, and must become, incomparably the most heavily armed nation in the world and the nation most completely ready for war . . . we cannot have any anxieties comparable to the anxiety caused by German rearmament".

Was this sufficient justification to strengthen the Royal Air Force? Sir Phillip Sassoon, Parliamentary Under-Secretary of State for Air, obviously thought so and set about sowing the seeds of rearmament, albeit in the face of Labour and Liberal censure. Yet these seeds were only just sufficient to provide the fruits of survival seven years later.

## CONCEPTION AND BIRTH OF THE HURRICANE

In 1933 the Royal Air Force had thirteen fighter squadrons, in whose hands the air defence of this country rested. Eight were equipped with Bristol Bulldogs (top speed 174 m.p.h.), three with Hawker Furies (top speed 204 m.p.h.) and two with Hawker Demons (top speed 182 m.p.h.)—in all Britain possessed 280 first line fighters. On the other hand Germany had no front line modern warplanes—at least none that could be recognised as such—yet the emergence of a militant party and the break-up of the Disarmament Conference came as a signal to the self-exiled German aircraft industry to return to the fatherland and continue its work surreptitiously, at least for a year or so. Within a twelvemonth work was well under way on one of Germany's greatest fighters, the Messerschmitt Bf 109, the principal antagonist of the R.A.F. fighters in the Second World War.

It was in 1933 that D.T.D. at the Air Ministry realised that the outcome of F.7/30 would be no more than another stopgap as there was every indication that at last the biplane had reached the zenith of its development.

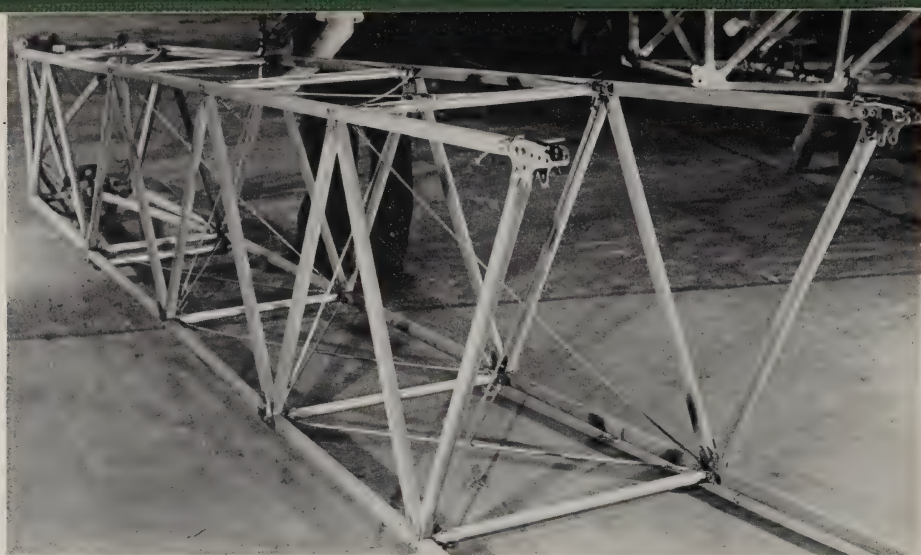
Monoplane fighters had been studied from time to time by almost every company in the industry, in particular by the Bristol Aeroplane Co. Ltd., and the Supermarine Aviation Works (Vickers) Ltd., while Sydney Camm had himself designed a small Jupiter-powered monoplane fighter in 1925, but this did not come to be built. Now, in 1933, the Hawker design team once again turned its attention to the monoplane and, since the Fury biplane was the fastest and most manoeuvrable fighter in service at the time, it was logical that this should be considered as the starting point of the new investigations.

In August that year Camm conferred with Major Buchanan of D.T.D. on the subject of future fighter requirements and the subject of a

possible monoplane development of the Fury was discussed. No drawings of such an aircraft then existed but, by the following October—the month of Winston Churchill's warning of the German resurrection—an initial design had been evolved and was shown to the Air Ministry. Due to the current promise being shown by the Goshawk it was proposed to use this engine. The new design, austere referred to as the Fury Monoplane, featured a fuselage similar in size and general layout to that of the High Speed Fury though the fuselage frames aft of the cockpit were to be deepened somewhat to permit a faired and enclosed cockpit. The wings were to be relatively thick cantilever structures with slight taper on leading and trailing edges. Little effort was made, at this stage, to alter the tail surfaces and a fixed spatted cantilever undercarriage was proposed. Alternative schemes had been prepared to cater for steam cooling, the necessary condensers being accommodated in a fairing resembling that for a conventional ventral radiator.

Bearing in mind that in 1933 D.T.D. was thinking of fighter speeds in the region of 275 m.p.h. (that is, an arbitrary increase of 25 m.p.h. over the F.7/30 stipulations) it is hardly surprising that the Fury Monoplane should evoke something more than academic interest for, although there is no record of the design speed anticipated, there is little doubt that the machine would have achieved the Air Ministry's figure.

In case this supposition requires some qualification it is perhaps convenient here to describe the system of airframe construction favoured by the Hawker company, for it had, over the past six years, proved to be immensely robust, light and simple to manufacture and repair. Not only was it in use in all the many Hart and Fury variants the world over, it was to continue in vogue on all



*The Hurricane's primary fuselage structure aft of the cockpit.*

Hawker aircraft up to the Typhoon. As early as 1925 T. O. M. Sopwith and F. Sigrist (then Works Director in the H. G. Hawker Engineering Company) advocated and developed a simplified metal fuselage primary structure. This was based on a pair of parallel Warren trusses to which were attached the frames carrying the wooden secondary stringers. Each Warren truss was fabricated using round steel or aluminium tubes swaged to square or rectangular section at their ends and bolted together through fish plates. A cup-ended bolt was passed through each joint and into this butted a ball-ended space member separating the trusses. The whole primary structure was braced by wires with tensioning turnbuckles. By 1927 the entire Hawker factory had transferred to this form of fuselage construction while a contribution to the wing design was made by the development, again by Hawkers, of a simple dumbbell spar. This featured two steel strips rolled to form a pair of flanged tubes connected together by a steel web. Apart from metal detachable engine access and front fuselage panels the whole airframe was fabric-covered.

This was the structure basis on which the Fury Monoplane was schemed. The wing was to be of conventional two-spar arrangement with diagonal cross bracing in the form of a Warren truss, the whole structure being fabric-covered.

First major alteration to the design occurred in January 1934. This was the substitution of the Rolls-Royce P.V.12 for the Goshawk engine. The

P.V.12 was the outcome of continued development of the Kestrel, and at the beginning of 1934 initial design performance figures were made available to Hawker Aircraft Ltd. At relatively small geometric and weight penalty, the new engine was expected to provide an increase of about 40% in take-off power while, with single-stage supercharging, the power output at rated altitude was something like 60% above that of the current Kestrel V (Full Power) engine. Gone, now, was the inconvenient steam-cooling system and the return to more conventional liquid-cooling largely offset the weight penalty. Bench running had commenced and arrangements were being made to adapt two Hawker Horsleys (*S1436* and *J8611*), the High-Speed Fury (*K3586*) and a Hart (*K3036*) as flying test beds for the new engine, and it was in the light of design experience achieved in these installations (more particularly that of the Hart) that the P.V.12 was successfully "designed into" the new monoplane. The small additional engine weight forward of the centre of gravity dictated that the radiator be moved about eighteen inches further aft than was customary on the Hart Variants, an expedient made possible by the deletion of the bomb-aimer's prone position under the pilot's cockpit. The new position of the radiator, together with its size, did not allow it to be made retractable (as on previous Hart Variants) and shutters were now included to regulate cooling airflow as dictated by flight conditions. Furthermore, by enclosing the radiator matrix within a

faired divergent-convergent duct, the airflow through the hot matrix contributed a small component of thrust.

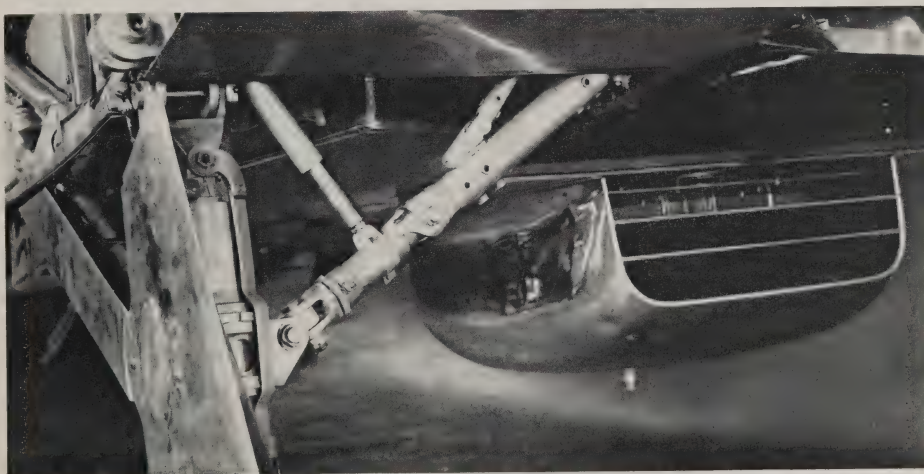
Following discussions between D.T.D. and Hawkers, the new engine installation was approved, but now that this last link with the Fury biplane was cut, the name Fury was dropped and the design henceforward referred to simply as the Interceptor Monoplane. In March 1934 stressing of the new aircraft commenced, and two months later detail design was taken up in the Experimental Drawing Office in Canbury Park Road.

By mid-1934 many countries had decided to embark on programmes of military expansion and in the field of aircraft design a number of significant technical advances were being made, not least, of course, was Britain's belated recognition of the monoplane's superiority over the biplane. Another development, in some respects just as ambitious and far-reaching, was the adoption of the retractable undercarriage; such a feature was by no means novel, yet no light combat aircraft had hitherto been produced in numbers with a reliable, fully retracting landing gear. By 1934, however, a generation of American biplanes with retractable undercarriages was appearing, and, whereas the retracting mechanisms were perhaps more ingenious than realistic as far as operational aircraft were concerned, the benefits bestowed were unquestioned. Positioning of the Hawker monoplane's radiator well aft now left the forward wing interspar centresection bay unobstructed

with the result that design of a retractable undercarriage was undertaken by Hawkers.

Retraction was, nevertheless, not straightforward. It is interesting to record that from these early days of the design, Camm envisaged the likelihood of operations from poor airfield surfaces and was therefore determined to maintain a wide wheel track and low pressure tyres, characteristics which undoubtedly endorsed the wisdom of choosing the Hurricane for operations from French landing strips during the campaigns of 1939 and 1940. Weight distribution of the aircraft demanded that the mainwheel oleos be mounted close to the front wing spar and inclined well forward, while the need to maintain a wide track resulted in the wheels being retracted inwards to meet on the aircraft's centreline. Such was the angle the oleos were canted forward, when in the down position, that it was necessary to incorporate a break in the side strut so that, during retraction, the oleo was lifted and drawn back by a radiusing link in order that the wheel would clear the main spar. Retraction was by means of a hand-operated Dowty hydraulic pump and, though perhaps complex in operation, the undercarriage was to become renowned for its strength and reliability, even though the aircraft's maximum take-off weight was to double over the next ten years.

At the time the Interceptor Monoplane entered the detail design stage in May 1934, the normal loaded weight was estimated at 4,600 pounds,



*A view of the prototype's centresection, showing the undercarriage retraction mechanism and the original radiator fairing.*

## THE HAWKER HURRICANE

this figure being based on the aircraft armed with two wing-mounted Browning guns and two fuselage-mounted Vickers machine guns. Whereas the Vickers guns were well-known and long-established in service, the provision of Browning guns was, as yet, purely speculative.

The recently-formed Armament Research Division of the Air Ministry had sponsored a competitive evaluation of various aircraft machine guns towards the end of 1933—Vickers, Lewis, Colt, Madson, Spandau, Kiraleji, Darne and Hispano—all had been exhaustively assessed in terms of reliability, rate of fire and powers of penetration, and in these terms one gun was considered far superior to the others. This was the American Colt which, designed for American 0.300-inch rifle-calibre rimless ammunition, was however unsuitable as it stood for use by the Royal Air Force. Negotiations had therefore started with the Colt Automatic Weapon Corporation to learn whether the Colt gun could be adapted to cater for British rimmed 0.303-inch cartridges without sacrifice of the high rate of fire—some 1,200 rounds per minute. By early 1934 confirmation that this was feasible had been received and installation drawings were distributed among the aircraft industry. What yet remained to be decided was how or whether a British manufacturer could acquire manufacturing rights for the Colt gun.

As it was, with the superiority of the Colt undisputed, the Air Ministry issued a draft Specification, F.5/34, for a fighter aircraft featuring a forward-firing battery of six or eight guns of this type; yet the feasibility of such a heavy armament had not been seriously considered—the Specification was issued as a means of initiating investigations into the design penalties involved. Undoubtedly the man behind these ideas was Squadron Leader R. S. Sorley (later Air Marshal Sir Ralph Sorley, K.C.B., O.B.E., D.S.C., D.F.C.), of the Air Ministry Operational Requirements Branch, who, in pursuance of the arguments in favour of the increased armament requirements of F.7/30, was aware that the rate of improvement in military aircraft performance was increasing and that the newly-proposed four-gun fighter armament was already inadequate.

However, while the Hawker project team was engaged in efforts to suit the private venture Interceptor Monoplane to meet F.5/34 by inclusion of the eight-gun battery, the basic design continued with provision for four guns only. A one-tenth scale model was built in June 1934 and started tests in the compressed-air tunnel at the National Physics Laboratory,

Teddington. At this stage the aircraft was expected to possess a normal all-up weight of approximately 4,600 pounds and it is convenient to record here that, although the loaded weight of the aircraft was to increase by 85% during the following ten years due to ever-increasing load-carrying demands, the structure weight was to increase from its initial figure of 1,420 pounds—somewhat less than a ton—by only 4 per cent. Moreover, this small increase was brought about by alterations to cater for the provision of greater armour protection and was in no way indictment on the structural integrity of the aircraft. Indeed, from the beginning, whatever criticisms may have been levelled at the aircraft during its career, no pilot can have complained legitimately that his Hurricane lacked strength.

In August 1934 tunnel tests up to equivalent speeds of 350 miles per hour on the model at Teddington confirmed the aerodynamic qualities of the design and, following design proposals put forward to the Air Ministry, Specification F.36/34 was drafted, agreed and issued at the end of the month.

Briefly, this Specification was superficially written around the Hawker proposals and set down requirements for a single-seat interceptor fighter possessing a top speed of about 320 miles per hour, this speed being attainable in level flight at about 15,000 feet, and to be armed with four machine guns (the type to be specified later) with a firing time of not less than twenty seconds. The fact that the numerically subsequent Specification was written about R. J. Mitchell's proposals for the Spitfire was no more than coincidental, for these requirements were couched in different terms, the emphasis being laid principally on rate of climb and manoeuvrability. The higher maximum speed achieved by the Spitfire later was a by-product of its light monocoque construction and lower profile drag, for the powerplant installation in each case was almost identical. These two Specifications, initiated as they were by the aircraft industry itself, were to set the pattern by which the Royal Air Force was to achieve parity with the *Luftwaffe* six years later, despite Germany's massive re-armament effort and the fact that her fighters could derive operational experience in the Spanish Civil War in the meantime.

Under the title of "F.36/34 Single-Seat Fighter—High Speed Monoplane", Hawker's design was officially tendered on 4th September 1934, and on 17th November the first drawings of the fuselage were issued to the Experimental Shops

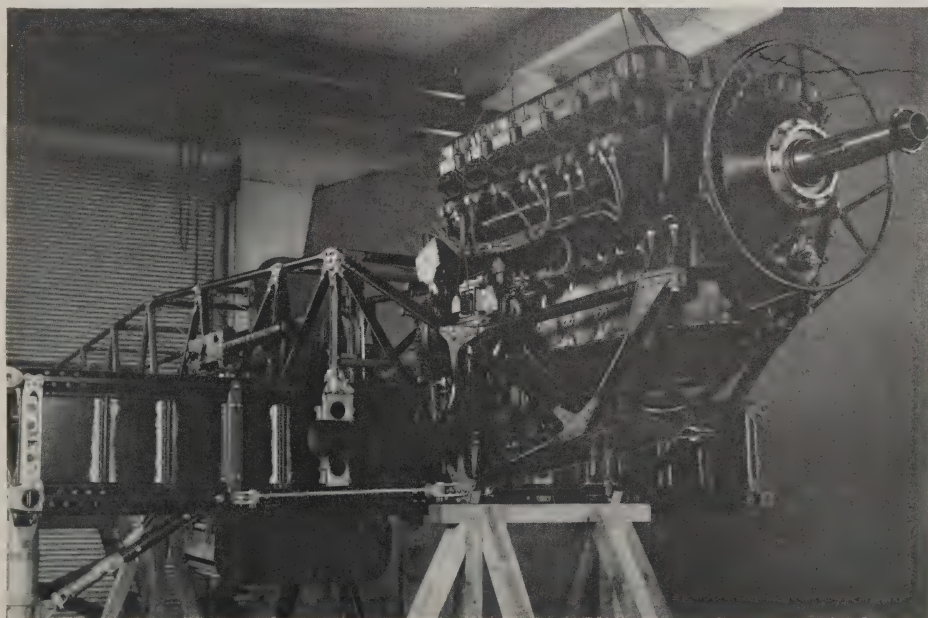
## BIRTH OF THE HURRICANE

for the purpose of preparing jigs. At about this time Rolls-Royce Ltd. announced an increase of 80 pounds in the installed weight of the powerplant, and, in order to maintain the centre of gravity range unchanged in normal flying trim, it was decided to increase the ammunition capacity for the four guns by about one hundred rounds per gun with the result that the all-up weight rose to 4,800 pounds.

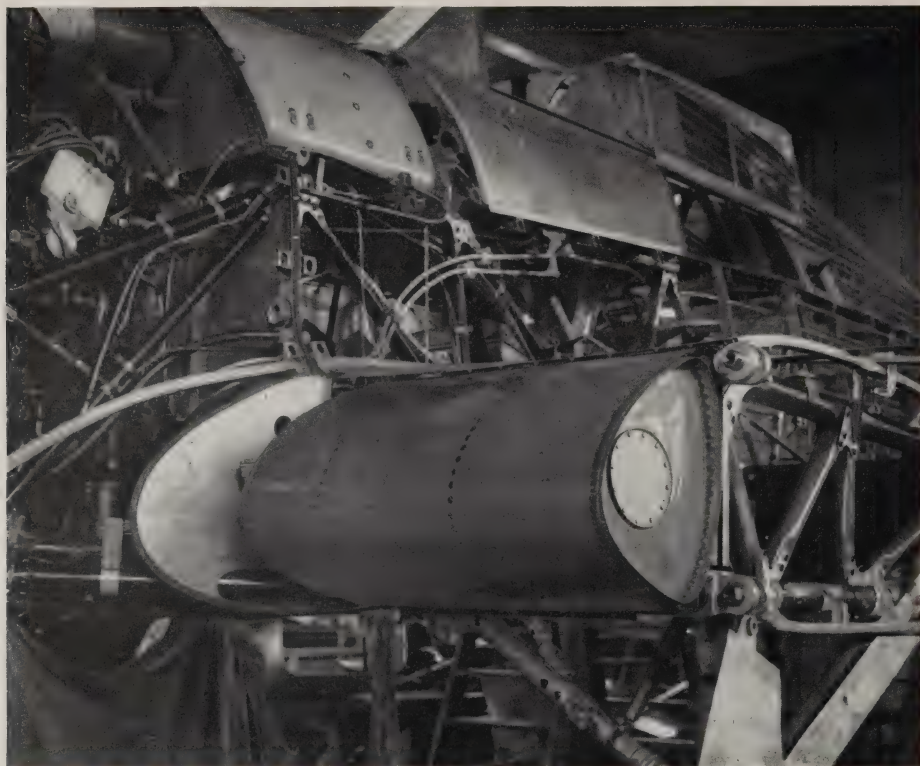
It was of this form that, in December, the Experimental Department commenced building a wooden mock-up of the design in order to study more realistically the problems associated with undercarriage retraction, coolant ducting, instrument lay-out, armament installation and pilot's field of vision. A conference with Rolls-Royce engineers on 18th December 1934 brought forth further performance estimates together with an undertaking that the installed powerplant weight would not exceed 1,200 pounds. The power output in the prototype fighter would be 1,025 brake horse-power at take-off, giving a power/weight ratio of 0.85, a remarkable achievement for a new engine in those days. Take-off engine speed was

to be 2,900 r.p.m. and the rated altitude, 15,000 feet.

On 10th January 1935 a conference on the F.36/34 mock-up was held in Canbury Park Road, Kingston, the Air Staff being represented by Air Commodore L. A. Pattinson (Armaments Research) and Wing Commander C. N. Lowe (Air Defence of Great Britain). It was explained that although the mock-up at present only provided for four guns the Hawker project staff had succeeded in preparing an initial design whereby the F.5/34 eight-gun armament requirement could be satisfied. However, Pattinson, quoting presumably from results of remote-firing Vickers gun trials, explained that the eight-gun battery would only be specified depending upon whether licence agreement could be reached to build the Colt gun, suitably modified for British 0.303-inch ammunition, in the United Kingdom. Two representatives of the Air Ministry Armament Group, Major H. S. V. Thompson and C. H. Keith, had recently returned from the United States and negotiations were in hand with the Birmingham Small Arms Company.



*An early picture of the F.36/34 prototype under construction showing the Merlin "C" engine and one of the fuselage-mounted Vickers guns.*



*This picture of K5083, taken in September 1935, shows the prototype nearing completion. Note the fuel tank in the wing leading edge, and the unstiffened cockpit canopy.*

Results of the first detailed performance calculations were forwarded to the Air Ministry on 21st February 1935. They showed the aircraft to have a maximum level speed of 330 miles per hour at 15,000 feet at a flying weight of 4,480 pounds. The take-off weight was now 4,900 pounds, resulting in a wing loading of about 19 pounds per square foot. Service ceiling was 32,500 feet, and absolute ceiling 34,800 feet. Landing speed, at a weight of 4,200 pounds and with flaps down, was expected to be slightly more than 70 miles per hour.

Issue of these figures coincided with receipt the same day from the Air Ministry of a manufacturing contract for one prototype of the new aircraft, the machine to be registered K5083. Still no

decision had been reached on the armament to be provided, although six weeks later it was provisionally agreed not to include any guns in the prototype, but to ballast the machine to cater for two Vickers Mark V guns in the fuselage and a Colt (Browning) gun in each wing.

Confirmation of licence production agreements between Colt and B.S.A. was finally ratified in July 1935 with the result that the prototype contract was altered to allow for the eight Browning gun wings (although, inexplicably, eight Vickers guns were still mentioned as alternatives).

Undoubtedly largely prompted by this increased armament to be carried in the wings, the Hawker project team commenced a design study into the

provision of metal stressed-skin wings. It was, moreover, considered that although Hawker's employed a very efficient means of securing fabric covering to their structures—quite adequate for normal flight at the speeds envisaged—any battle-damage suffered at high airspeed would probably cause ballooning of the remaining skin and loss of large quantities of fabric. By reason of the considerable alterations to the manufacturing facilities available, however, the "metal" wing was not to appear on production aircraft until 1939.

Manufacture of the F.36/34 prototype had commenced early in 1935 and continued at Kingston rapidly throughout the summer months. Yet, lest it be thought that this machine occupied the Experimental Shops' sole attention, it should be recorded that no fewer than three other prototypes and two mock-ups were also under construction or conversion. The Hart and Fury Variants were still commanding the entire production effort at Kingston and Brooklands, while production lines for the Hind bomber and Fury Mark II fighter were being planned. Aircraft deliveries from Brooklands reached a peak of nine per week in August 1935 and, in anticipation of orders such as these, considerable re-organisation had been necessary.

With the formation of Hawker Aircraft Limited in 1933 (as a public company—out of the old H. G. Hawker Engineering Company) the Board of Directors, T. O. M. Sopwith, Frank Spriggs and Fred Sigrist, applied themselves to the task of strengthening the Company and improving its production capacity. Unfortunately the Com-

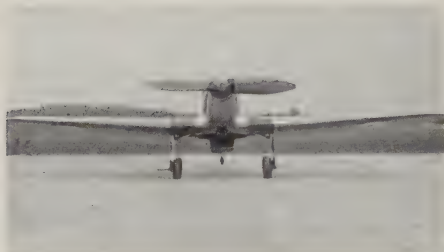
pany's principal factory area near Ham Common in Richmond Road, Kingston, had been leased to the Leyland Motor Company in 1928, and fifteen years remained before the lease expired. The main machine shops were housed in premises in Canbury Park Road together with the Administrative Offices, Experimental Shops and Design Offices. Component manufacture and initial assembly was undertaken in these confined quarters, the half-completed aircraft being taken by road to Brooklands, about eight miles distant, for completion and flight testing.

The political and military implications of international events in 1933 and 1934 were such that, coupled with Britain's slow emergence from the world economic crisis, the Government felt obliged to call on the aircraft industry to bear a greater financial responsibility for the development of new equipment likely to be required by the air force. In view of these ramifications and as a result of heavy orders for Hawker aircraft, Sopwith decided to acquire further manufacturing premises and, in 1934, successfully bid for takeover of the Gloster Aircraft Company at Brockworth. Spriggs became Chairman at Glosters while Hawker's Board was strengthened by the appointment as Directors of Sydney Camm (Chief Designer), Flight Lieutenant P. W. S. Bulman (Chief Test Pilot), H. Chandler, H. K. Jones and R. W. Sutton in the following year. Yet pre-occupation with the Gauntlet at Glosters in 1935 only permitted production of Hawker Hardys, Harts and Audaxes to be transferred to that factory, and still the floors at Kingston worked to capacity.



*The Gloster Aircraft Company factory at Hucclecote, where 2,750 Hurricanes were subsequently built. A picture taken in 1934.*

## THE HAWKER HURRICANE



*Five views of K5083 shortly after its completion at Brooklands late in October 1935. Note the braced tailplane and absence of radio mast.*

By August 1935, *K5083* was structurally complete with the new Merlin engine (as the P.V.12 had been named) installed. Ballasting for the eight-gun wing had taken the loaded weight to 5,200 pounds, while a small increase in fuel tankage was to add a further 150 pounds. Skinning of the airframe and preliminary system checks occupied about six weeks and on 23rd October the new prototype was taken from Canbury Park Road to the Hawker assembly shed at Brooklands. The fabric-covered wings were assembled on to the centresection, undercarriage (including tail-wheel) retraction tests were performed and engine

running commenced. Weighing the aircraft, fully ballasted for guns, ammunition and radio, and fuelled up, showed the all-up weight to be 5,416 pounds and the centre of gravity position to be within half an inch of that estimated in the design.

Then, following a few taxiing runs, during which Bulman acclimatised himself to the closed cockpit and the bulky nose—which demanded more weaving than had been necessary previously in order to see ahead—*K5083* was ready for flight and, on 6th November 1935, the famous Hawker test pilot lifted the silver monoplane off the grass at Brooklands for the first time.

## Chapter 3

# PREPARATION FOR PRODUCTION

The background to events which occurred at about the time of the new Hawker prototype's first flight in November 1935 was characteristic of the urgency and single-mindedness which was to follow development and production of the Hurricane throughout its life. Powerplant and airframe had hitherto advanced in concert up to the point when *K5083* was moved to Brooklands, but then a setback occurred; the Merlin "C" engine failed to pass the necessary civil 50-hour provisional certificate of airworthiness test.

However it was decided not to delay flight trials by waiting for the customary certification and it was with Merlin C, No. 11, that *K5083* first flew. The 50-hour certification was however received on December 18th, by which time the Hawker aircraft had completed about six hours flying. Nevertheless trouble was being experienced with the Merlin C and several engine changes were made during those first few months. A record of those early test flights may be of interest:

<i>Date</i>	<i>Test</i>	<i>Engine</i>	<i>A.U.W.</i>
6th Nov. 1935.	1st flt. Handling.	Merlin C No. 11	5,420 lb.
11th Nov. 1935.	2nd flt. Handling.	Merlin C No. 11.	5,270 lb.
23rd Nov. 1935.	3rd flt. Handling.	Merlin C No. 11.	5,270 lb.
26th Nov. 1935.	4th flt. Handling.	Merlin C No. 11.	5,270 lb.
29th Nov. 1935.	Engine handling and undercarriage operation.	Merlin C No. 11.	5,270 lb.
3rd Dec. 1935.	Engine handling.	Merlin C No. 11.	5,270 lb.
15th Dec. 1935.	Initial performance measurements.	Merlin C No. 11	5,628 lb.
26th Dec. 1935.	Engine and airscrew evaluation.	Merlin C No. 11.	5,660 lb.
5th Feb. 1936.	Test with new engine.	Merlin C No. 15.	5,670 lb.
7th Feb. 1936.	Performance with new engine	Merlin C No. 15.	5,670 lb.

*Below: An early in-flight picture of K5083.*



## THE HAWKER HURRICANE

All these flights were undertaken by Flight Lieutenant P. W. S. ("George") Bulman, while other experimental flying was carried out by Philip Lucas and the greater part of Hawker's production flight testing by John Hindmarsh.

Bulman was one of those pilots whose name was known universally. His scintillating displays of Hawker biplanes had brought many a crowd to its feet in those halcyon days at Brooklands and Hendon in the 'twenties and 'thirties. His perfect judgement of effect and climax was matched by an astute technical insight that was of inestimable value to the flight shed personnel and design staff alike. Bulman had served in the Royal Flying Corps during the First World War and later in the Royal Air Force as a test pilot at the Royal Aircraft Establishment, Farnborough, before joining H. G. Hawker Engineering Co. Ltd., in 1925. He had flown every Hawker machine since and, apart from his early work on the Hurricane, it will be for his exciting displays of Harts and Furies that he will be remembered best.

Philip Lucas, who was to join Bulman in the Hurricane flight programme later in 1936, recalls the day, 9th May 1931, on which he first joined H. G. Hawker Engineering Company at Brooklands. He had just entered Bulman's office to report for duty when there was the sound of a crash outside. Dashing out, the two pilots found Gerry Sayer (who was, in 1934, to join Glosters as Chief Test Pilot) climbing out of the wreckage of the old prototype Hart/Osprey J9052 which he had attempted to take-off with crossed controls. Lucas was later to be awarded the George Medal for saving the prototype Typhoon from destruction when a serious failure of the fuselage monocoque occurred during an early test flight. He was to follow in George Bulman's footsteps as Chief Test Pilot in 1945 and, in 1948, joined de Havillands as Technical Sales Manager.

Third of the Hawker team of test pilots in 1936 was John Hindmarsh. He had been seconded into the Royal Air Force from the Army for a tour of duty with Army Co-operation squadrons but thereafter chose to remain in aviation rather than to return to the army, and secured his appointment with Hawker Aircraft in 1935. That year he also achieved fame as a motor racing driver by winning the Le Mans *Grand Prix d'Endurance* twenty-four hour race in a Lagonda. He did not participate in the Hurricane flying until late in 1937 when production aircraft started to appear in numbers.

It was Bulman, however, on whom responsibility rested to guide the new monoplane through its early trials. Already he had initiated a number of



*Flight Lieutenant P. W. S. ("George") Bulman, C.B.E., M.C., A.F.C.*



*Flight Lieutenant Philip Lucas, G.M.*

## PREPARATION FOR PRODUCTION

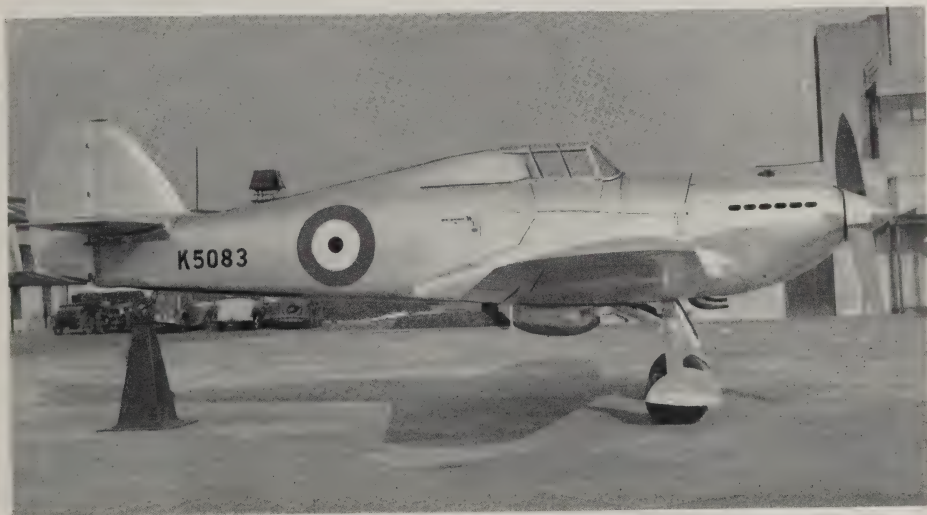


*The late John Hindmarsh.*

small improvements in the prototype; he had recommended the addition of further frame stiffening in the hood panels to overcome vibration of the canopy caused by the slipstream. Engine cooling troubles led to the provision of a larger radiator and fairing, and the temporary strut bracing the tailplane was removed. Thereupon, after his flight on 7th February 1936, Bulman expressed himself satisfied that the prototype was ready for initial evaluation by the Royal Air Force and so, only three months after its first flight, K5083 was delivered to the Aircraft and Armament Experimental Establishment at Martlesham Heath in Suffolk.

The trials which took place at Martlesham on K5083 between 18th and 24th February 1936 were relatively brief but simply covered performance and handling, and the report, issued by the A. & A.E.E. was intended to reflect the Service's initial impressions of the new fighter. Trouble was still experienced with the Merlin C engine, supercharger bearings failing, valve springs breaking and automatic boost control capsules collapsing. However these shortcomings were of academic significance only, since it had been decided not to continue with the Merlin C but that production engines would probably be of a later variety.

Performance measurements on K5083 indicated a maximum speed of 315 miles per hour at 16,200



*K5083 at Brooklands shortly before its second move to Martlesham Heath. The tailplane strut has been removed and the radio installed. Note also the additional canopy frames.*

## THE HAWKER HURRICANE

feet (the temporary rated altitude of the Merlin C, No. 15) at an engine speed of 2,960 r.p.m. and 6 pounds boost. Climb to 15,000 feet from unstick was effected in 5.7 minutes, and 20,000 feet was reached in 8.4 minutes. Service ceiling was 34,500 feet and the estimated absolute ceiling, 35,400 feet. At take-off against a 5 m.p.h. headwind, the aircraft had a ground run of 265 yards, flying off at 81 m.p.h. indicated airspeed. For landing without flaps the stalling speed was 77 m.p.h. and, using brakes, the ground run was 205 yards. With flaps (which at this stage extended across the underside of the fuselage) the stall occurred at 57 m.p.h., and, without brakes, the ground run was 525 yards. With a fuel and oil load of 107.5 and 7 gallons respectively, the trials were carried out at an all-up weight of 5,672 pounds, no provision having yet been made to carry guns or radio, but ballast for these being carried in the fuselage.

Regarding the handling qualities of the new prototype the Service pilots (headed by Squadron Leader D. F. Anderson, D.F.C., A.F.C.) were well satisfied in general only remarking that aileron and rudder controls became rather heavy as high speeds were attained. The closed cockpit was found to be most comfortable and the pilot's view for take-off and landing was considered good. The retractable undercarriage proved something of an innovation and, apart from slight damage caused to the wheel flaps (which were subsequently removed permanently) while taxiing over uneven ground, was complimented for its strength and reliability.

The prototype thus passed its initial trials without serious trouble and was returned to Brooklands where it commenced further evaluation and development. A brief visit was paid to Rolls-Royce Ltd., in order to rectify the remaining minor engine faults on Merlin C No. 19 (which had been fitted at Martlesham after Nos. 15 and 17 had failed).

Rumours of an Air Ministry production contract for the F.36/34 fighter had been circulating since the previous December and the success attending these initial Service trials, together with mounting international tension (Italy had recently attacked Abyssinia), seemed to lend weight to such a probability. It was therefore decided at Hawkers to commence work to production standards and in March 1936 the Production Drawing Office started on production drawings. Simultaneously the production planning department embarked on draft schedules to cater for an arbitrary potential output of one thousand machines.

This confidence and anticipation in the design found ample justification when, on 3rd June 1936, the Company received and agreed a contract, No. 527112/36, for six hundred aircraft. A week later only, on 8th June, fuselage manufacturing drawings were issued to the Production Shops and on 27th June the Air Ministry officially approved the name "Hurricane".

This was the largest production order ever placed at a single time for a military aircraft in Britain during peacetime and undoubtedly re-



*A fine air study of the Hurricane prototype taken after the Martlesham trials of 1937. Armament has been installed (note the bead foresight), and the radiator bath is up to production standard.*

flected the growing anxiety now being felt at Air Ministry for the re-equipment and expansion of the Royal Air Force. Furthermore about five hundred Hawker Hart biplane variants had yet to be built by their parent firm during the next two years, resulting in this Company becoming by far the most heavily committed in the aircraft industry.

Meanwhile, however, in furtherance of the Government-advocated policy to rationalise the aircraft industry, as well as being a natural expedient to strengthen his own production resources, T. O. M. Sopwith announced in July the formation of a Trust to acquire all the shares of the Siddeley Development Company. Thus, in one stroke, he added to the two-year-old Hawker-Gloster combine the large aircraft companies of A. V. Roe & Co. Ltd., Sir W. G. Armstrong Whitworth Aircraft Ltd., and Armstrong Siddeley Motors Ltd., and so formed the nucleus of the great Hawker Siddeley Group. An early benefit of the formation of the Trust and its greatly increased capital holding was the securing by Hawker Aircraft Ltd. of a loan to cover the manufacture of a factory at Parlaunt Park Farm, Langley, Bucks, for the express purpose of Hurricane production. This factory was completed in 1939 and was to produce over 7,000 Hurricanes during the Second World War.

In the meantime *K5083* was the subject of increasing urgency. Immediately after the production contract had been raised, a conference was held at Kingston to decide on the Standard of Preparation. The Merlin I was provisionally decided on for initial aircraft, as were fabric-covered wings, and it was anticipated that the first production aircraft would be ready by May or June, 1937. These provisions were included in Air Ministry production Specification 15/36 which was issued to Hawker Aircraft Limited on 20th July 1936. Earlier that month the prototype had been shown to the public for the first time at the Royal Air Force Pageant at Hendon, again being flown by Squadron Leader Anderson of the A. & A.E.E.

Shortly after return to Brooklands, the landing flap centresection was removed as it had been suspected that when selected "down" it restricted the cooling flow through the radiator (the Merlin was always rather prone to overheating at low airspeeds), and in this form the aircraft was first flown by Bulman on 15th July.

In August the eight Browning gun armament was installed in the wings and, again fitted with Merlin C No. 17 temporarily driving a Watts propeller without spinner, was flown on 17th of

that month. On the same day Hawkers received notification that normal Service handling and performance trials were to be conducted at Martlesham Heath during September and October, and throughout the remainder of August Bulman applied himself to the task of minute preparation for these important trials.

The trials were successfully completed without any trouble; small improvements in performance were evident, the maximum speed now being confirmed at 318 miles per hour at 15,500 feet and the rate of climb fractionally increased. However, since no spinning trials had yet been conducted by Hawkers, these could not be included in the Martlesham programme. *K5083* returned to Brooklands once more on 20th October and embarked on preliminary spinning trials in Bulman's hands on 6th November.

Meanwhile development of the engine was progressing at Derby. The Merlin C, although still fitted in *K5083*, had been superseded by the Merlin F and this engine was intended to enter production as the Merlin I. However only one hundred and eighty examples were built and most of these were destined for installation in the first production Fairey Battle light bombers (some of the remainder being used in experimental aircraft, including the certification Horsleys at Derby and the first Hawker Henley light bomber prototype, *K5115*).

It was then decided not to proceed with the Merlin I in production and already—in December 1936—a further version, the Merlin G, was being run. The promise being shown by this prompted its choice for both the Hurricane and Spitfire, production lines for which were already being prepared.

Principal difference between the Merlin I and Merlin G (the Mark II) lay in the inclination of the rocker box flanges, this necessitating considerable alteration to the upper engine cowling contours on the Hurricane. Other changes included an increased carburettor air intake area, slightly altered airscrew reduction gear ratio associated with about forty r.p.m. available from the engine for take-off and a half-degree decrease in the airscrew pitch. These changes were found to bestow much smoother engine running at full power setting. Due to the alterations to the cowl shape the glycol header tank had to be re-positioned, requiring new mountings. Engine controls and the hand starting system were also improved.

The extent to which the introduction of the Merlin II was to influence the nose profile was

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*The first production Hurricane I, L1547. Note the early "kidney" exhaust stubs and the flight instrument venturi on the side of the cockpit.*

also instrumental in delaying the production lines by almost four months. Yet the decision to change was taken in the interests of production rate and, from the start, the Merlin II production was some twenty per cent greater than the rate that had been achieved on the Merlin I.

A number of minor troubles had meanwhile been encountered on the prototype. *K5083* was, early in 1937, delivered to Martlesham for prolonged Service trials and, during the course of intensive combat flying at high speeds, the hood mountings were proving inadequate and canopies were lost no fewer than five times. (Although an apparently satisfactory mounting was developed for the prototype, the same modification proved unsatisfactory on the early production aircraft and hoods continued to be lost until finally a remedy was found in March 1938.)

From time to time during the summer of 1937 *K5083* returned to Brooklands for small modifications to be included and these brief visits enabled Lucas and Hindmarsh to obtain some flight experience on the new monoplane. The first Merlin II (No. G.7) was delivered to Kingston and installed in the first production Hurricane (*L1547*) on 19th April 1937. Five months later, on 8th September, this aircraft was taken by road to Brooklands for final assembly, weighing and engine running. The initial standard included Watts Type Z.38 two-blade wooden airscrew, fabric-covered wings and eight Browning guns harmonised to converge at 650 yards (this was

later progressively reduced until by October 1940 the harmonisation range had shortened to 200 yards).

First flight by *L1547* was carried out on 12th October at an all-up weight of 5,459 pounds, being flown by Philip Lucas, and was followed six days later by the second aircraft. By the end of November seven production machines were flying, each performing about a dozen flights to clear them to Service Standard of Preparation. It is interesting perhaps to remember that in those days the Maintenance Units did not exist as such to take delivery of new machines and distribute them among the squadrons; therefore the aircraft were fully equipped and cleared by the manufacturer and delivered direct to the operational squadrons. Thus, with about thirty aircraft—Hinds as well as Hurricanes—being completed every month, the volume of work undertaken by the handful of test pilots was enormous. It was estimated that during 1938 alone no fewer than 3,200 flights were carried out from Brooklands on Hawker aircraft by Bulman, Lucas, Hindmarsh and Reynell.

Added to this production flying was the experimental work, not only on the Hurricane but on the Henley and Hotspur. Though these two latter aircraft did not influence the development of the Hurricane—rather *vice versa*—they were so closely associated that brief mention is not considered out of context.

The Hawker P.4/34 Henley was conceived as a fast light day bomber to supplement and, perhaps,



*Dick Reynell lost his life on 8th September 1940 in the Battle of Britain during a temporary posting to No. 43 (Fighter) Squadron.*

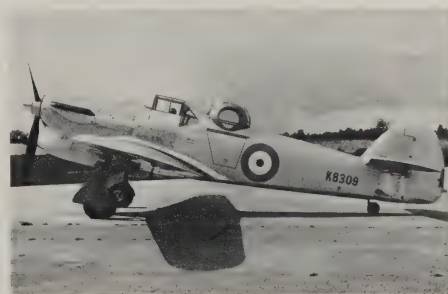
eventually to replace the Fairey Battle. As the Specification suggests, the design was initiated in 1934, the Hawker project being intended to utilise as many Hurricane jigs as possible in order to reduce production time and cost. It transpired however that, owing to the utmost priority afforded to the Hurricane, the Henley suffered relegation and the first prototype, *K5115* (with a Merlin F), did not fly until 24th March 1937. Already doubts were being expressed by the Air Staff as to the wisdom of expending time, money and effort on a "second generation" light bomber while the Battle had yet to justify its choice in the first place. Moreover it was obvious that production of the Henley could not be undertaken by Hawkers and plans were discussed to transfer development to the Gloster Aircraft Company. It transpired that only the wings were built on Hurricane jigs, the fuselage being a completely new design to accommodate the crew of two.

For no fault of the aircraft design itself, the decision was finally made to relegate the Henley to target-towing duties and, in all, one prototype and two hundred production aircraft were built at Brockworth. However wise this decision was, some aspects cannot be overlooked. The Henley was stressed to withstand dive bombing loads, and there were significant occasions during the first eighteen months of the War when the R.A.F. could (in the absence of fighter opposition) have undoubtedly operated dive bombers successfully,

but were unable to do so as none existed. Certainly the choice of target-towing was unwise, for the wear on the Merlin engine (which was quite unsuited for prolonged flight at low airspeeds and high r.p.m.) soon resulted in numerous accidents. It was presumably due to this high rate of attrition under ridiculous circumstances that a relatively good aircraft came to receive a bad name.

The overriding consideration, however, must be that as the Henley was *not* adopted for front line duties, it did little to absorb production efforts on the Hurricane, and for that we must be grateful!

The career of the other design associated with the Hurricane was even less auspicious. This was the F.9/35 Hotspur two-seat turret fighter, designed and built in competition with the Boulton-Paul Defiant, as a replacement for the Hawker Demon turret biplane fighter, and conceived under the same outmoded philosophy. Once again, preoccupation with the Hurricane delayed the Hotspur, the prototype (*K8309*) not flying until 14th June 1938. This design was also intended to use Hurricane wing jigs, but due to the aft movement of the centre of gravity caused



*Above: The first production Henley target tug (L3243) which later crashed at Langham, Norfolk. Below: The Hawker Hotspur, K8309.*

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by the four-gun turret and ammunition, considerable modification to the wing centresection joint was found necessary; after deletion of the eight-wing-gun battery, the wing ribs were re-arranged, the centresection moved forward four inches (in relation to the position of the Hurricane's wing) and the rear spar attachments shortened. These alterations gave slightly greater sweepback than that on the Hurricane. By the time *K8309* flew, the Defiant had already been ordered into production; whether the Hotspur would have fared any better than the Defiant in the Battle of Britain is open to doubt. It was certainly lighter and faster in a comparison of

prototypes, but so short was the Hotspur's flying life in its intended context that comparisons are likely to be unreal. Again, had Hawkers diverted more attention to the Hotspur there might have been far fewer Hurricanes during the Battle of Britain; as it was, plans for A. V. Roe & Co. Ltd. to put the Hotspur into production were cancelled and *K8309* remained the sole example built.

Thus, with the old biplane contracts beginning to taper off at the end of 1937, Hawker Aircraft Ltd. was heavily engaged in Hurricane production; and by Christmas that winter the first machines had been delivered to Fighter Command—to No. 111 (Fighter) Squadron at Northolt.

## Chapter 4

# THE HURRICANE ENTERS SERVICE

With the Hurricane now established in production by the autumn of 1937, it is worthwhile briefly to show here how the Royal Air Force's programme of expansion was progressing and how the Hurricane was to fit into the structure of the air defences of Britain as they were being shaped during the twelve months before the Munich crisis of 1938.

Lord Swinton, as Secretary of State for Air in 1935, had initiated the "Shadow Factory" scheme wherein a small number of different aircraft and engine types could be built in large quantities by factories either of other industries or specially built for the purpose in dispersed areas away from industrial centres. The fighter organisation for the defence of Britain (previously known as Air Defence of Great Britain) was in July 1936 re-constituted on the Command basis and took its place, under Air Chief Marshal Sir Hugh Dowding, as Fighter Command alongside Bomber and Coastal Commands. The expansion plans, which had prior to 1936 called for a first-line aircraft defence strength of 1,500, were then increased to 1,750 of which approximately 1,000 were to be fighters.

Production Scheme "F" was promulgated in 1936 calling for 500 Hurricanes and 300 Spitfires to be in service by March 1939, and this programme would undoubtedly have been met had not production been delayed at the beginning of 1937 by the change from the Merlin I to the Merlin II.

The intermediate phase of expansion between December 1935 and December 1937 had, by and large, been covered by large-scale production of Hawker Hinds, Furies, Harts, Hectors and Demons, Gloster Gladiators and Gauntlets, in preparation for the final generation of aircraft under the re-equipment programme. These ultimate aircraft were principally the Hawker

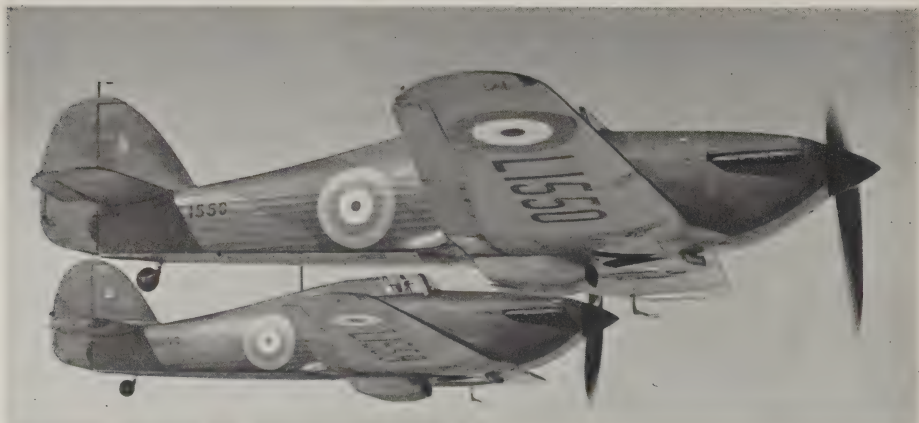
Hurricane and Supermarine Spitfire fighters, Fairey Battle and Bristol Blenheim light bombers, Armstrong-Whitworth Whitley, Handley-Page Hampden and Vickers-Armstrong Wellington "heavy" bombers, Westland Lysander army co-operation and Avro Anson training aircraft.

In January 1938 Fighter Command possessed or was in the process of forming twenty-six Regular and Auxiliary fighter squadrons, of which 10 flew Gauntlets, 7 Demons, 4 Furies and 4 Gladiators. One squadron (No. 111 (Fighter) Squadron at Northolt) had taken delivery of its first Hurricanes, while No. 25 (Fighter) Squadron was equipping with mixed flights of Demons and Gladiators.

Nine months later, in September 1938, with international tension mounting as Germany secured agreement with Britain, France and Italy for her forces to occupy Sudetan German territories in Czechoslovakia, Britain had made some progress in her re-armament. Though Fighter Command had grown by only two squadrons, five squadrons now possessed Hurricanes, while Furies and Gauntlets were being phased out of service. Deliveries of Spitfires were also just beginning.

As remarked above, No. 111 (Fighter) Squadron, based at Northolt, was by the beginning of 1938 receiving Hurricanes. By Christmas 1937, one Flight had received four aircraft, *L1548-L1551*, and during January and February 1938 a further twelve machines, *L1552-L1561*, *L1563* and *L1564*, were delivered. One by one the Squadron's Gloster Gauntlets were disposed of and, under the command of Squadron Leader John Gillan, started working-up on the new monoplanes. Some of the less-experienced pilots regarded their Hurricanes with misgiving, sentiments that were not reassured by a number of accidents during the first weeks, one Sergeant

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*First R.A.F. Squadron to receive the Hurricane was No. 111 based at Northolt.*

pilot losing his life and two aircraft being damaged during landing accidents.

It may have been partly to instill a feeling of pride and improve morale among his pilots that Gillan decided, albeit at short notice, to attempt a high speed flight from Northolt to Turnhouse (Edinburgh) and return, on 10th February 1938. Having encountered strong headwinds on his flight northwards, Gillan landed late in the afternoon but decided to return the same day in order to benefit from the high winds which would now favour him. Taking off in the gathering dusk shortly after 5 p.m. he climbed to about 17,000 feet, an altitude at which his engine was rated to give most power and at which height the wind was assisting him by about 80 miles per hour. Without oxygen and flying above cloud Gillan managed to obtain one "fix" near Bedford and thereafter put his Hurricane into a shallow dive during which his indicated airspeed rose to about 380 miles per hour. On breaking cloud he identified his base airfield and commenced a wide turn (in his own words "startled at the realisation that the ground-speed was likely to be in the region of 450 miles per hour"), landing at Northolt shortly before 6 p.m. He had covered the 327 miles in 48 minutes at an average speed over the ground of 408.75 miles per hour. What is perhaps of much greater technical significance is that his engine speed had remained above 2,950 r.p.m. throughout the flight for he had used almost take-off boost from the start until he recovered from his dive at Northolt. Such an achievement speaks volumes for the reliability of the Merlin for, without a constant speed propeller (not fitted on Service aircraft for a

further eighteen months) the overspeeding engine was undoubtedly subjected to considerable stresses.

Thus was the public made aware of Fighter Command's new equipment, and no one felt inclined to dwell overmuch on the tailwind that had contributed to the achievement. At once No. 111 (Fighter) Squadron became regarded as a *corps d'élite* and the trepidation amongst the pilots vanished. Within six weeks another Squadron, No. 3 at Kenley, was receiving its new machines; this time Gladiators were discarded and eighteen Hurricanes (*L1565-L1573, L1576-L1580, L1582, L1586-L1588*) were flown in.

In the meantime, however, a modification had appeared which materially altered the Hurricane's already familiar silhouette. Temporarily equipped with a tail parachute, the first production aircraft, *L1547*, had been retained by the manufacturers and towards the end of 1937 production spinning trials at Brooklands and Martlesham had demonstrated a slight deficiency in rudder effect during spin recovery, and it was decided to extend the rudder three inches lower and into this extension add a ventral spine. At the same time the tailwheel was fixed, these modifications being introduced first in *L1547* on 19th January 1938, and in production aircraft from 7th March that year.

While deliveries to the squadrons accelerated—the average rate of six aircraft per week during March 1938 rose to eight per week later that

year—the Hurricane was undergoing an intense programme of development at Brooklands.

*L1547*, which had originally flown with a Merlin G (No. 7), was now, early in 1938, powered by a production Merlin II (No. 463) and at a loaded weight of 6,017 pounds possessed a top speed of 316 miles per hour. Rolls-Royce ejector exhausts were then compared with the "kidney" type and, as a result of a 2 m.p.h. improvement, the ejector manifolds were made standard on production aircraft.

Undoubtedly the most important development of the Hurricane during 1938 commenced on 29th August with trials of the de Havilland Hamilton two-pitch three-blade metal propeller on *L1562*. Using a fine pitch of 30.5 degrees for take-off and 42.5 degrees for coarse pitch in flight, this airscrew, although incurring a weight penalty of nearly 300 pounds, bestowed a significant improvement



*During a test flight on this early Hurricane, L1582, the cockpit break-out panel came adrift, wrenching up the sliding hood and exposing the pilot to the slipstream.*



*This in-flight view of L1683, taken during test, shows the new Rolls-Royce exhaust ejector stubs. Note also the flight effects on the wing fabric.*

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in the climb, reducing the time to rated altitude by a full minute. Flight trials on *L1652* continued for several months and although the overspeeding characteristics during diving and spinning left much to be desired, production aircraft—commencing with *L1780*, issued to No. 213 (Fighter) Squadron in January 1939—were equipped with the new D.H. propeller. It is interesting to record here that Germany had, as early as 1937, recognised the considerable benefit bestowed on fighter performance by use of the variable-pitch propeller for in the spring of that year—eight months before a production Hurricane had flown—twenty-four Messerschmitt Bf 109B-2's, equipped with Hamilton two-blade variable-pitch metal airscrews, had been supplied to the first and second *Staffeln* of *Jagdgruppe* 88 fighting with the Condor Legion in the Spanish Civil War. By 1939 VDM constant-speed propellers were standard on the *Luftwaffe's* Bf 109E fighters.

Construction of Hawkers' new Hurricane plant at Langley was, by the autumn of 1938, well under way and, supported by heavy Supplementary funding approved after the Munich crisis, the Government placed a further order for one thousand Hurricanes with Hawkers on 1st November. It transpired that five hundred of these were subsequently built by Gloster Aircraft Company (after a change in Air Ministry policy had relegated the Henley to third line duties), while many of the remainder were assembled and flown at Brooklands.

Meanwhile Hawkers' test pilots had been hard pressed in their programme of production flying. Bulman and Lucas still performed the bulk of experimental flying, occasionally assisting Hindmarsh with the production work. Then on 6th September, Hindmarsh lost his life in a Hurricane (*L1652*)—the cause of the accident was never discovered—and R. C. Reynell, and later J.

*Left: L1652, the sixteenth production Hurricane, used for flight trials of the D.H.-Hamilton two-pitch 3-blade metal airscrew in 1938.*

Grierson, joined the Company for production flying.

It was towards the end of 1938 that reliable information started to reach the Air Ministry regarding the armament of German fighter aircraft and the existence of the Messerschmitt Bf 109D-1 with its 20-mm. MG FF cannon prompted discussions on the provision of increased armour protection for Hurricanes and Spitfires. A conference on 7th December 1938, dealing with the Hurricane, clarified the position. Scheme A, already implemented, provided for an armoured bulkhead immediately forward of the Hurricane's cockpit; Scheme B incorporated a bullet-proof windscreen to be added to production aircraft during the next three months while further armour plate was to be installed immediately aft of the pilot by September 1939. The armoured windscreen was first flown as a trial installation on *L1652* by Lucas on 6th February 1939, and the full Scheme B armour was flown in *L1750* by Lucas on 5th April 1939.

Ever since the original Hele-Shaw-Beecham variable-pitch propeller had flown experimentally during the late 'twenties, developments of pitch-changing airscrews had progressed slowly in this country. By the end of 1938 the firm of Rotol Ltd. (formed under the auspices of Rolls-Royce and Bristols) was, under Air Ministry contract, testing an hydraulically-operated constant-speed three-blade propeller. Hawkers were quick to recognise the obvious benefits of this airscrew and, after the announcement by Rolls-Royce of the Merlin III which featured a standardised propeller shaft capable of accommodating either Rotol or de Havilland propellers, determined to demonstrate the advantages and set about a trial installation. Purchasing back from the Air Ministry an old production airframe (*L1606*, ex-No. 56 (Fighter) Squadron), the company installed a Merlin III (No. 11111) with a 10 ft. 6 in. diameter Rotol three-blade constant-speed wide-pitch-range propeller. This aircraft, now company-registered *G-AFKX*, was first flown in this state by Lucas on 24th January 1939. Five days later initial performance evaluation showed the aircraft, at an all-up weight of 6,402 pounds, to possess a top speed of 328 miles per hour at 16,200 feet, while the time to 15,000 feet was 6.2 minutes.

The provision of metal stressed-skin wings on the Hurricane had been initiated as long ago as 1935 and it was these wings that were to be interchangeable with those of the Hotspur and Henley. The Henley, intended for service as a dive bomber, had flown in prototype form (K5115) on 10th March 1937, fitted initially with fabric wings, but due to the contention that speeds reached in dives might prove too much for the fabric covering especially in the presence of ground fire, priority was given for metal wings on the Henley. The prototype pair was first flown on the Henley prototype on 20th August 1937, and due to the urgency to maintain a high production rate of Hurricanes it was decided to retain fabric wings on that aircraft for the time being. However, the decision to relegate the Henley to target-towing duties, together with a reduction in the quantity on order and the transfer of production to Glosters, brought about renewed acceleration in the development of the Hurricane's metal wings. The first set, fitted on Hurricane L1877, was flown by Lucas on 28th April 1939. A further dozen hand-tooled stressed-skin wing sets became available during the following four months and were applied *ad hoc* amongst the remaining production Hurricanes of the first batch. By September, moreover, tooling had reached such a stage that from the outbreak of War an increasing number of Hurricanes possessed metal wings and the last fabric-covered set left Brooklands in March 1940, and, from February that year onwards metal wings were "cannibalised" from otherwise scrap aircraft in order to bring early production Hurricanes up to a later standard.

This was the tempo at which development of the Hurricane was progressing; many were the minor alterations and improvements test flown during the early months of 1939, some so small as not to warrant mention, yet some, listed here, were of greater interest or significance:

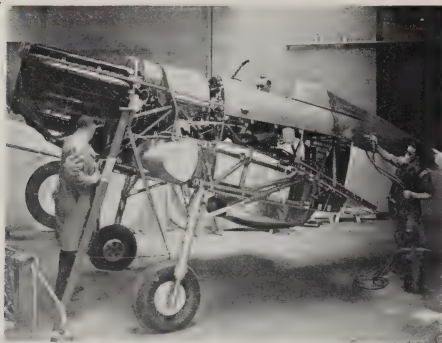


Previously one of No. 56 Squadron's aircraft, L1606, was used by Hawkers as G-AFKX for flight trials of the Rotol constant-speed propeller.

Two other schemes of considerable importance that were applied to the Hurricane before the outbreak of war were the "desert conversion" and the twin-cannon installation. In the former instance it had been decided by the Chiefs of Staff as early as February 1939 that, should war break out with Germany, possible sympathetic reactions by Italy might endanger British interests in the Middle East and that fighter aircraft of modern conception must be available for reinforcement of that area within eighteen months. With the stated policy of the Air Staff to conserve Spitfires for home defence it was not unnatural that the choice of fighter should fall to the Hurricane. Moreover interest already evinced by Turkey and Persia in orders (of which more anon) for the Hurricane had encouraged the Hawker Design Staff to start preliminary investigation of the effect of tropical conditions on high performance aircraft. Much experience had already been gained in the operation of Harts, Audaxes, Hardys and Hartbees in the African and Middle East deserts, and so in collaboration with the firm founded by

Aircraft	Test	Date	Engine	Pilot
Hurricane L1562 ..	D.H. constant speed 11 ft. diameter propeller	23rd Feb. 1939	Merlin II (Special)	P. G. Lucas
Hurricane G-AFKX	Rotol constant speed propeller with magnesium blades	2nd May 1939	Merlin III	R. C. Reynell
Hurricane L1696 ..	Trials with slotted wings ..	3rd May 1939	Merlin II	R. C. Reynell
Hurricane G-AFKX	Metal wings and TR.1133 radio fitted	4th July 1939	Merlin III	K. G. Seth-Smith
Hurricane L1856 ..	Experimental engine with 100-octane fuel and pure water cooling	6th July 1939	Merlin VIII (Special)	R. C. Reynell
Hurricane L1856 ..	Engine proposed for future production version. 100-octane fuel	17th July 1939	Merlin XII	R. C. Reynell

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*Early Hurricanes at Brooklands. The lower picture shows undercarriage retraction tests on L1595.*

C. G. Vokes—specialists in fluid filtration—Hawkers added a large Multi-Vee chin filter under the Hurricane's nose forward of the carburettor air intake; this was designed to prevent the Merlin engine from inhaling the fine but destructive dust and sand particles. The first aircraft so equipped, L1669, was flown by Lucas on 17th May 1939. (More about this aircraft is told in Chapter 7.)

The trial installation of two 20-mm. Oerlikon cannon was carried out in Hurricane L1750 (and first flown by Lucas on 24th May 1939) at the request of the A. & A.E.E. as a gun test aircraft and as part of the programme to introduce these guns into service. Already the first Westland Whirlwind prototype, scheduled for a four-cannon armament, had flown and the Service test authorities were anxious to achieve in-flight firing experience with these guns in readiness for the twin-engine fighters. It should be emphasised however that this installation in the Hurricane was not considered in any way part of the Hawker

machine's development at the time. The view still persisted (which had prevented a scheme tendered in 1936 for a four-cannon Hurricane from coming to fruition) that only a relatively large twin-engine fighter could fly and fight with such a heavy armament. It was the success which attended the trial two-cannon installation which prompted Camm to re-introduce the four-cannon proposals early in 1940.

Returning to the progress being made by Fighter Command in its programme of introducing the Hurricane into service, squadrons busied themselves in working up to combat readiness. For pilots with experience only on Gauntlets and Furies the new monoplanes undoubtedly proved a handful yet, by and large, accidents were few. At the Empire Air Day displays at the end of May 1938 R.A.F. Hurricanes appeared at Kenley, North Weald, Doncaster, Northolt, Hendon, Biggin Hill, Martlesham, Cranwell and Gosport. In July that year Hurricanes of No. 111 Squadron took part in a fly-past over Paris, one of the aircraft returning from Villacoublay to Northolt in the record time of 51 minutes. The same month Hurricanes participated in large-scale air defence exercises over South East England, partly designed to show up any weaknesses in the new machines. As if to underline the successful conclusion of this trial, the Under-Secretary of State for Air, Capt. H. H. Balfour (later Lord Balfour of Inchrye) piloted a Hurricane at the end of August, passing comment that it was "a nice aeroplane for an old gentleman to fly!"

The Munich crisis brought Fighter Command to an operational state of readiness; leave was cancelled and pilots were recalled. No. 3 (Fighter) Squadron was one of the Hurricane squadrons alerted and its pilots lingered near their armed-up



*Aircraft "L-Love", L1599, of No. 56 (Fighter) Squadron.*

fighters at Biggin Hill while *Lufthansa* airliners droned their way overhead—busy photographing our defence airfields.

The immediate crisis over, the squadrons got down to training with renewed vigour for already many enlightened people were aware that the period which followed was merely the calm before the storm. Hurricanes again visited France in November, this time an aircraft taken straight from the production line at Brooklands accompanying the aged prototype to the Paris Aero Show.

The 1939 Empire Air Day displays included solo or squadron appearances by Hurricanes at Anstey, Castle Bromwich, Doncaster, Filton, Halton, Hanworth, Harwell, Hawkinge, Hendon, Henlow, Hucknall, Manby, Manston, Martlesham, Netheravon, Northolt, North Weald, Tangmere, Thorney Island, Waddington and Wittering. Later in May 1939 six squadrons of Hurricanes gave a display at Northolt before Members of Parliament.

Reynell again took a Hurricane to the continent, this time giving a brilliant display of aerobatics at the Brussels Exhibition in July, flying the old prototype K5083. But already the shadow of impending war hung in the European sky. Germany had occupied Czechoslovakia in March and the following month Italy marched into Albania. Hitler commenced a round of meaningless non-aggression pacts with Denmark, Latvia and Estonia, and went on to formulate a close association between the air forces of Italy and Germany. At home the Secretary of State for Air, Sir Kingsley Wood, introduced Air Estimates of £205 million—the largest in the history of the Air Ministry. An agreement was signed with France permitting R.A.F. aircraft to over-fly French territory in the course of exercises and on 8th August more than 1,300 aircraft took part in a defence exercise involving the air and ground forces of south-east England.

Yet the twelve-month respite, darkened though it was by international events, certainly allowed Britain to escape the fate of so many European countries in later months. It has been estimated that between October 1938 and September 1939 the Royal Air Force doubled its effectiveness, an estimate entirely borne out by the fact that, out of the 497 Hurricanes which had been delivered to the fighter squadrons and into reserve, three quarters of this number had been completed in the last year. Of the nine Spitfire squadrons established at the outbreak of war, seven had received their new machines during 1939.

At the outbreak of war on 3rd September 1939 the R.A.F. possessed eighteen squadrons of Hurricanes. Thus far all the aircraft had been completed at Brooklands as the other production lines were not yet ready. However, lest it be thought that these machines represented the whole Hurricane output we must now turn back about eighteen months to follow the traditional efforts by Hawker Aircraft Limited to secure orders for their aircraft from foreign governments.

### The Foreign Hurricane Orders\*

Continuing a close association between Hawker Aircraft Ltd. and Yugoslavia, which had started in 1931 and had witnessed deliveries and licence production of substantial numbers of Furies and Hinds to that country ever since, an order was received early in 1938 for the supply of twelve Hurricane I's to the Royal Yugoslav Air Force. These aircraft, selected at random from the first Air Ministry production line at Kingston, were Merlin II-powered machines with fabric-covered wings, and the first aircraft delivered (No. 205, ex-L1751) was flown out from Brooklands on 15th December 1938 to Belgrade through France and Italy. Shortly afterwards a second order for twelve aircraft, negotiated on a government-to-government basis, together with application to build Hurricanes under licence in Yugoslavia, were received. These machines—N2718 to N2729—were again extracted from an Air Ministry contract, though now the aircraft were powered by Merlin III's driving D. H. three-blade variable-pitch airscrews and possessed metal wings. Delivery of these Hurricanes commenced in February, 1940.

Having successfully concluded licence negotiations the Yugoslav government placed a production order for forty Hurricanes (based on the late-series Mark I's) with P.S.F.A.Z. Rogozarski at Belgrade and followed up with an order for a further sixty from the "Zmaj" (*Fabrika Aeroplana I Hidroplana*) factory at Zemun. These excellent factories were expected to achieve a combined production rate of twelve aircraft per month by the summer of 1941 but when, on 6th April that year, the *Luftwaffe* commenced its customary *blitzkrieg* in support of the Nazi invasion, fewer than twenty licence-built Hurricanes had been delivered to the R.Y.A.F. Engines had been shipped from the United Kingdom while the air-

\*Note. In order to avoid complication of the subsequent narrative, the fortunes of the pre-War foreign Hurricanes are followed throughout their service in this Chapter.

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*A magnificent air-to-air picture of an early Yugoslav Hurricane flown by Lucas. Twenty-four such aircraft were exported to Yugoslavia and licence production was undertaken before the German invasion.*

screws (Hamilton constant speed) were licence-built by Ikarus A.D. at Novi Sad.

At the beginning of the German attack, the R.Y.A.F. had on strength thirty-eight Hurricanes, of which eighteen equipped the 51st Fighter Squadron of the 2nd Regiment based at Sarajevo, fourteen were with the 33rd Fighter Squadron of the 4th Regiment based at Zagreb and the remaining six with the 34th Fighter Squadron, also of the 4th Regiment. Unfortunately the approach of

German forces obliged Yugoslav patriots to destroy and abandon the Zemun factories though the air force continued to use the airfield for several days.

For a week the Yugoslav Hurricanes were in constant action, being flown as interceptors against the *Luftwaffe* over Zagreb and Bosnia and as ground attack fighters against the advancing German army. However by 13th April, because of fog and the proximity of the enemy to their

bases, the Hurricane pilots were unable to continue operations and therefore had to destroy their aircraft. One or two managed to escape to Paramythia in Greece where they were promptly destroyed by the *Luftwaffe*.

One of the Yugoslav aircraft deserves special mention, for it is believed to have been the only Hurricane to have flown with an engine other than the Merlin. For the purposes of performance and handling comparison with the Merlin-powered version (and with the possibility of being deprived of the source of this engine's supply in mind), the Royal Yugoslav Air Force initiated the installation of a 1,050-h.p. Daimler-Benz DB601A engine in one of the Hurricanes early in 1941. The conversion was carried out by a working party from the Ikarus company at Zemun, this firm also being responsible for manufacture of the engine mountings and cowlings, and for adaption of the cooling system. During subsequent flight trials in comparison with the Merlin-powered Hurricane I, Yugoslav pilots seem to have favoured the DB-powered version, possibly by reason of the slightly different power rating. Such a comparison would, however, only have been entirely realistic had the DB version been the subject of quantity-tooled production methods.

After the first Yugoslav Hurricane order of 1938 the next Hurricanes to go overseas were destined for the South African Air Force. In 1934 Mr. Oswald Pirow, the South African Defence Minister, had embarked on a programme for the expansion of his air force and had acquired a production licence for, among other aeroplanes, sixty-five Hawker Hartbees general purpose aircraft in addition to four Brooklands-built machines.

By 1938 the S.A.A.F. had gone far towards becoming a well-equipped force and during that year received a small number of ex-R.A.F. Fury fighters. In November however, following sales representations by Hawkers, the South African government persuaded the Air Ministry to release seven Hurricane I's from storage and these (among them *L1708*, *L1710* and *L1711*) were supplied and shipped from No. 36 M.U. during that and the following month. On arrival and assembly at Durban the first machine flew the 335 miles to Pretoria in little over an hour, and with the other machines formed part of No. 1 Squadron, S.A.A.F. shortly afterwards. None of this original batch however saw action in the Middle East for by mid-1940 all had succumbed through the lack of carburettor air filters.

In the same month that South Africa negotiated

for her seven Hurricanes the Air Ministry—perhaps confident in the belief that the Munich agreement of the previous month really *did* fore-shadow "peace in our time"—agreed to enter into negotiations to release twelve Hurricanes from contract to Rumania, a decision not entirely unconnected with a visit that month by King Carol, who inspected a Hurricane and watched formation air drill by Fighter Command at Odiham. Commercial arrangements however took rather longer to complete in this instance and the first machine to be despatched from Brooklands (*L2077*) did not leave until a week before war broke out in Europe. Whether or not these aircraft played any active part in the War when Rumania became involved early in 1941 is not known.

During the autumn of 1938 Canada ordered twenty Hurricane I's from the Air Ministry and the first of these were also released immediately after Munich. Shipped to Montreal and transported across Canada, they were assembled at Vancouver, the first six being completed by the end of February 1939. As however the threat of war grew thoughts turned to the vulnerability of Britain's aircraft factories and early in 1939 an Air Ministry Specification was drawn up for the Canadian Department of National Defence; thereafter a contract was placed with the Canadian Car & Foundry Co. Ltd., of Montreal, by the Air Ministry who released a further pattern aircraft (*L1848*) on 2nd March 1939. The first of forty aircraft ordered under this contract reached Britain only a year later, an achievement bearing testimony to remarkable feats of organisation in Canada as well as in Britain, for drawings of every component, jig and tool were committed to microfilm and sent in duplicate to the Canadian company. From 1940 onwards production of the Hurricane in Canada amounted to 1,451 aircraft, built under contract for the Royal Air Force placed by the M.A.P. and under contracts with the Canadian Departments of Munitions and Supply for the R.C.A.F.

Only brief mention need be made here of the two Hurricanes supplied to Persia in 1939 and 1940 respectively. Following the visit of a delegation from Middle East countries in March 1939, the Persian government placed an order for eighteen Mark I's with Hawker Aircraft. Deliveries could not however be got properly under way, only one machine (*L2079*) being despatched before War broke out and another in 1940 (*P3720*). The contract was then held in abeyance for completion after the War (see page 137).

In April 1939 the Belgian government placed an

## THE HAWKER HURRICANE

order for twenty Hurricanes and Avions Fairey (Société Anonyme Belge) secured from Hawkers agreement to build the fighters under licence. The first aircraft (L1918) left Brooklands the same month but it seems evident that the last five Hawker-built machines did not reach the Belgian Air Force before the German invasion in the Spring of 1940. Eighty licence-built Hurricanes were ordered from the Gosselies factory of Avions Fairey, these aircraft differing from the British-built version in being armed with four wing-mounted 12.65-mm. (.5 cal.) Browning machine guns. Only two of these machines had been completed and flown by the time of Belgium's enforced entry into the War and one other aircraft awaited an engine from England.

Following British and French guarantees of aid to defend Poland's independence given in March 1939, the Polish Air Force placed an order for one Hurricane (L2048, released from Air Ministry contract) for evaluation and secured an option on nine others. In the event only the first reached

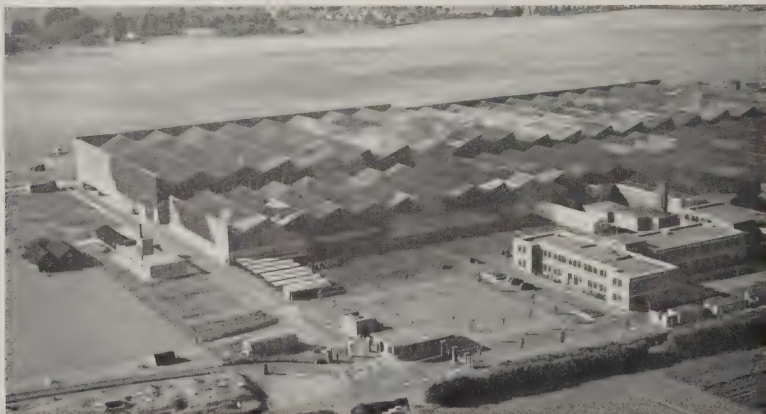
Stettin before the Germans attacked Poland and, although the aircraft covered by the option had already been despatched, the consignment was diverted to Gibraltar (see page 66).

Turkey was the only other foreign country to place an order for Hurricanes with Hawker Aircraft before the War, the development of suitable tropical air filters delaying delivery. It transpired however that the declaration of War accelerated delivery demands and the aircraft were packed up and shipped off (the first machine, L2125, leaving Brooklands on 14th September 1939).

Thus despite the urgency to introduce the Hurricane into service during 1939, such was the acceleration achieved in the rate of production that the output from Brooklands alone managed to satisfy the increasing demands of R.A.F. operational and reserve units, as well as maintaining a surplus from which the Air Ministry felt able to release about a hundred aircraft for sale or supply to foreign governments.



*Left: The Hawker assembly shed at Brooklands. Past it runs the famous motor racing circuit with the village of Byfleet beyond. Below: The large factory built by Hawker Aircraft Ltd. for Hurricane production at Langley, Bucks, in 1938-39 with the airfield beyond. This remained the Company's principal airfield until after the War when airliner traffic and high performance jet aircraft rendered it unsuitable.*



## Chapter 5

# THE HURRICANE GOES TO WAR

*During the first ten months of the War, when Germany gathered up her spoils all over Europe in campaigns against Poland, Denmark, Norway, Holland, Luxembourg, Belgium and France, no other single fighter type was encountered more frequently by the Luftwaffe than the Hurricane.*

The declaration of war against Germany on 3rd September 1939 set in train the planned actions to support the British Expeditionary Force, which was forthwith assembled and hurriedly embarked for France. On the one hand fighters were required to accompany and protect the offensive force known as the Advanced Air Striking Force, and on the other, fighter cover for the B.E.F. was to be provided, this protection being the principal responsibility of the Air Component.

Dowding was insistent that his home defences should suffer the minimum deployment overseas and determined to retain the Spitfires at all costs. Thus it was that, despite demands by the French Cabinet for at least ten fighter squadrons, Fighter Command agreed to deploy four Hurricane squadrons across the Channel, Nos. 85 and 87 (F) Squadrons forming the fighter element of the Air Component, and Nos. 1 and 73 (F) Squadrons accompanying the A.A.S.F. Two other Hurricane squadrons (Nos. 607 and 615 of the Auxiliary Air Force) also joined the Air Component later.

Of the two A.A.S.F. Hurricane squadrons, No. 1 moved first, flying sixteen Hurricanes (all early Mark I's with wooden propellers) to Le Havre on 8th September, then to Cherbourg on the 10th, and finally to its permanent base at Vassincourt on the 15th. No. 73 Squadron moved to Caen on 10th September. At once the value of the Hurricane's sturdy wide-track undercarriage was appreciated for the French airfields, in the main, lacked adequate drainage and the soft ground would have wrought havoc with a weaker landing gear. As it was the Hurricanes withstood the poor field conditions throughout their stay in France with remarkably little trouble.

But for many weeks the R.A.F. Hurricanes in

France had little to do but perform routine patrols. The Luftwaffe contented itself with limited front line reconnaissance, always managing to escape the attention of patrols by diving into cloud. It was, however, No. 1 Squadron that drew first blood for the R.A.F. in France, the encounter being recorded in the official diary:

Vassincourt. 30th October 1939. Local patrol maintained throughout the day. At 1430 hrs three enemy aircraft were seen at a high altitude over the aerodrome. The aerodrome defence section immediately took off in pursuit and one of the raiders was overtaken at 18,000 feet ten miles west of Toul, and shot down by Plt. Off. P. W. O. Mould (in Hurricane *L1842*). The other two escaped in cloud. The enemy shot down was a Dornier Do 17 and appeared to have been taken by surprise as no evasive tactics were employed and no fire was encountered by Plt. Off. Mould.

This same Hurricane was to feature in another combat report shortly afterwards, a report which bears witness to the Hurricane's remarkable ability to withstand considerable damage and yet return home.

Vassincourt. 23rd November 1939. At 1145 hrs a section of three aircraft, led by Flt. Lt. Plinston, was patrolling at 20,000 feet between Verdun and Metz when he sighted a Heinkel ahead and above him flying towards Germany. He pursued the enemy and overtook it over the frontier. A number of attacks were carried out ... the enemy was shot down near Saarbrücken. Sgt. Clowes (in Hurricane *L1842*) carried out the last attack which finally brought it down, but just as he broke away six Moranes arrived and commenced to attack. In this attack one Morane hit Sgt. Clowes' tail, taking away half his rudder and one elevator. He managed to



*A Hurricane I of No. 1 (Fighter) Squadron landing at Vassincourt, France, September 1939.*

return to Vassincourt but crashed on landing. He received no injuries.

Meanwhile No. 73 Squadron had also been in action and its first victory was claimed by Fg. Off. E. J. Kain on 2nd November when, at a record height for combat of 27,000 feet, he shot down a Dornier Do 17. In general, though, activity over the Western Front was limited, in all about twenty enemy aircraft being destroyed by the R.A.F. fighters in air combats over France during 1939.

Before the end of the year some of the replacement aircraft reaching the Hurricane squadrons were equipped with variable-pitch de Havilland propellers (Kain's action referred to above being fought in such a machine). Minor troubles beset the squadrons from time to time, operating as they were in far from ideal conditions; an example was a spate of gun stoppages which proved to be due to the use of thirty-year-old ammunition that had deteriorated and caused the Brownings in the Hurricane to jam.

Early in the New Year No. 1 Squadron received a fresh complement of Hurricanes, all powered by Merlin III's driving either de Havilland variable-pitch or Rotol constant-speed propellers (the first three, N2380-N2382, arriving on 1st January 1940), and by March the Squadron was entirely re-equipped. But before we follow the events which were to see these aircraft so heavily committed in the Battle of France, the fortunes of Hurricanes in other countries must first be recorded.

Hurricanes were, in January 1940, already being supplied to the gallant Finnish Air Force which, almost on the threshold of its capital's gates, was thwarting the supposed Russian ambitions for



*Carrying the Finnish national swastika, HU460 was among the Hurricanes exported in 1940. Note the tail snowskid.*

possession of the north Swedish ore mines. These twelve Hurricanes, believed to have been selected from stocks held at Nos. 19 and 20 Maintenance Units at St. Athan and Aston Down, were Merlin III-powered machines with D.H. propellers, but shipped by neutral vessel to Finland they arrived in time to see only six weeks of combat against the Red Air Force before the peace treaty was signed and hostilities ceased on 12th March.

It was on 9th April 1940 that Germany launched her invasion against Norway, an almost bloodless seizure of Denmark having resulted in a shortening in the striking range required by the *Luftwaffe* in its attacks on Norway. Although the German campaign in Norway had, to some extent, been anticipated by the Admiralty and War Office, the pre-War planning by the Air Staff had lacked provision, by this time, of an R.A.F. fighter capable of supporting ground operations at such long range. Only the converted Blenheim fighter could reach Norway from Britain, but any time

spent in combat would have prevented its safe return, so marginal were the fuel reserves. Moreover its light four-five gun armament would have produced little effect except in the absence of enemy fighters.

Thus it was that, in view of the probability of having to use small improvised landing grounds in Norway, Gladiators of No. 263 (F) Squadron and Hurricanes of No. 46 (F) Squadron were chosen, it being decided to send groundcrews and equipment by merchant vessel while the aircraft were shipped out in H.M. Carrier *Glorious*.

Trials had previously been conducted by three Hurricanes of No. 46 Squadron, flying from Prestwick on 3rd May, aboard H.M.S. *Glorious* in order to test the suitability of the aircraft but when, on 10th May, the Squadron was ordered to follow, the remaining Hurricanes were embarked by lighters at Greenock. It transpired, however, that the Hurricanes could not, for the time being, be used, as their proposed landing ground at Skaanland in the north of Norway had not yet been made ready. The Gladiators were, nevertheless, flown off, and landed on the frozen Lake Lesjaskog between Aandsnes and Dombaas; unfortunately it is not within the scope of this book to recount the valiant campaign fought by those aircraft, save only to record that they alone were responsible for the R.A.F.'s protection of British forces in Central Norway from 23rd April until withdrawn on 26th May northwards to Bardufoss, fifty miles from Narvik.

On 26th May, No. 46 (F) Squadron, under the command of Sqdn. Ldr. K. B. B. Cross, returned to Norway aboard the *Glorious*. All the Hurricanes were successfully flown off, but the first three machines to arrive at Skaanland nosed over in the soft ground and the remaining fifteen aircraft were diverted to join the Gladiators at Bardufoss.<sup>1</sup> Their purpose in these high latitudes was to protect the naval forces anchored off Narvik, but due to their enforced operation from the more distant airfield the Hurricane pilots at once found themselves at a disadvantage.

Two days later the Squadron drew blood, Plt. Off. MacGregor (in Hurricane L1853) destroying a Junkers Ju 88 over Tjelbotn. Later the same day the Hurricanes came across a pair of Dornier Do 26's disembarking troops in Rombaksfjord and destroyed both aircraft. Patrols over our forces in the north continued, patrols which de-

manded much both from the pilots and groundcrews, on the one hand due to the rugged terrain and narrow fjords, and on the other to the intense cold. Several other enemy aircraft, attempting to interfere with our shipping and ground forces, were shot down or driven off during the next few days but, on 3rd June, the evacuation of British forces at Narvik commenced. Still No. 46 Squadron continued to provide air cover, sending up relays of Hurricanes to maintain standing patrols over the vessels.

By 7th June the withdrawal was virtually complete, and since none of No. 46 Squadron's pilots had taken part in the carrier trials at Prestwick it was decided not to risk life by attempting to land the Hurricanes back on a carrier, but to destroy the aircraft at Bardufoss and evacuate the pilots by sea. However, mindful that the country could ill-afford to waste such aircraft, Cross begged to be allowed to attempt a landing on the *Glorious* and, having been granted permission, called for volunteers. In the words of the Squadron diary

"100% volunteered. Tests were carried out with extra weight in the tail of the Hurricanes. At 1800 hrs Flt. Lt. Jameson, Fg. Off. Knight and Sgt. Taylor took off for H.M.S. *Glorious* and landed successfully. At 1810 and 1815 hrs Fg. Off. Mee and Plt. Off. Drummond returned from a patrol over Narvik during which they engaged four Heinkels. Each pilot claimed to have shot down an enemy aircraft, and Plt. Off. Drummond attacked and damaged the other two.

8th June 1940. 0045 hrs. Sqdn. Ldr. Cross, Flt. Lt. Stewart, Fg. Offs. Cowles, Frost and Mee, Plt. Off. Bunker and Flt. Sgt. Shackley took off for H.M.S. *Glorious*."

As before all aircraft landed-on safely, while the remainder of the officers and men embarked on the M.V. *Arandora Star* and sailed for home.

However, tragedy was to strike within twelve hours. Enemy warships—no less than the *Scharnhorst* and *Gneisenau*—came upon the *Glorious* as she steamed southwest for home, and inside a hundred minutes the great carrier, heavily hit by repeated salvoes, rolled over and sank. With her went the pilots and all the Hurricanes that had provided such an epic fight in Norway. Only Cross himself and Flt. Lt. Jameson survived the Arctic seas on a Carley float, to be picked up many hours later by a passing vessel and taken to the Faroe Islands.

Thus ended the Norwegian fiasco, characteristic of the effect of German *blitzkrieg* on an almost defenceless—albeit stubbornly resisting—neutral country. Such a contingency had found no place in

<sup>1</sup> The eighteen Hurricanes were L1793 L1794 L1798, L1804, L1806, L1812, L1814, L1815, L1816 L1853, L1892, L1961, L1980, L1988, N2543, N2633, P2632, and P2652.



*H.M. King George VI inspected R.A.F. squadrons of the Air Component in France early in December, 1939. The three Hurricanes nearest the camera belong to No. 85 (Fighter) Squadron.*

the long term strategic planning by Great Britain and, coming as it did so soon after the outbreak of war, it found her almost powerless to participate to any great advantage.

### **The Invasion of the Low Countries.**

Returning once more to the Hurricane squadrons in France, an interesting event had occurred on 2nd May 1940. A Messerschmitt Bf 109E was forced down—undamaged—at Amiens, where it was immediately inspected and flown by pilots of No. 1 (F) Squadron. Having been assessed in mock combat with their own Hurricanes, the verdict was that the Hawker machine (when equipped with a constant speed propeller) was “infinitely more manoeuvrable at all altitudes and faster at ground level.” The German machine was, nevertheless, praised for its superior field of view and it was acknowledged to be the faster at its rated altitude. The aircraft was flown to Boscombe Down by Fg. Off. M. H. Brown on 4th May where it proved to be of immense value in the estimation of the flying qualities of this the principal enemy fighter.

Long before the German offensive in Norway had achieved all its objectives, Hitler ordered his army against the Low Countries. On 10th May Germany invaded Holland, Belgium and Luxembourg, the object being to turn the flank of France’s supposedly impregnable Maginot Line. The

*Luftwaffe* carried out a heavy raid on Rotterdam on 14th May, enemy paratroops seized key points and the following day Holland capitulated. The small part played in the defence of Belgium by Hurricanes has already been mentioned in the previous Chapter, and on 28th May the Belgian army surrendered.

Thus in little over a fortnight the whole of northern France became exposed to the onrush of German armies; the B.E.F. had moved forward into Belgium, covered by the Air Component squadrons, but almost immediately was forced to withdraw owing to the Belgian army’s surrender. After the first attack on Belgium on 10th May the Air Component, which already included four Hurricane squadrons (Nos. 85, 87, 607 and 615), was forthwith reinforced by three more—Nos. 3, 79 and 504. Another Hurricane squadron, No. 501 of the Auxiliary Air Force, was sent out to the A.A.S.F. which was now heavily engaged behind the Maginot Line further south, and within an hour of arrival this squadron was in action against about forty Heinkel He 111K’s. While No. 501’s Hurricanes were thus engaged in action the groundcrews, spare pilots and equipment were brought over to Betheniville from Tangmere. Unfortunately, while coming in to land, the last transport aircraft crashed killing three pilots and injuring six others.

No. 501 Squadron during those first two days—

## THE HURRICANE GOES TO WAR

11th and 12th May—covered itself with glory and demonstrated that the Auxiliary Air Force was every bit as determined and skilled as the Regular force. On 11th May the remaining pilots shot down two Messerschmitt Bf 110's, two Heinkel He 111K's and two Dornier Do 17's. The following day they destroyed seven Heinkel He 111K's, three Dornier Do 17's, a Messerschmitt Bf 110 and a Junkers Ju88, though two Hurricane pilots were lost.

The Hurricane strength in France was now ten squadrons—the number originally demanded—yet the odds against our pilots were usually very heavy, as demonstrated by the following combat report, taken from No. 3 Squadron's diary:

Merville. 12th May 1940. Morning. Fg. Off. Bowyer, Sgts. Ford and Simms (Blue Section) and Flt. Lt. Carter, Plt. Off. Carey and Plt. Off. Stephens (Green Section) met between fifty and sixty Junkers Ju 87's, Dornier Do 17's and Heinkel He 111K's between Diest and Louvain. Plt. Off. Carey destroyed one Ju 87 and one He 111; Plt. Off. Stephens destroyed two Ju 87's; Sgt. Simms destroyed two Ju 87's. Between Diest and St. Trond the Squadron also destroyed two Henschel Hs 126's.

The Hurricane pilots were constantly in action, often being ordered to land at hastily prepared landing strips as their own bases were overrun by the advancing German armies. As it became clear that the principal thrusts in the north were aimed at the Channel ports, the A.A.S.F. squadrons

were moved back south-westwards where, for a few days, the fighters flew from grass strips in the area of Troyes. The Hurricanes were, for the most part, now switched to the protection of our troops while only occasionally could they be spared to escort the Blenheim and Battle light bombers, with the result that casualties among the latter increased disastrously.

A further thirty-two Hurricanes and pilots had been sent out to France from Britain on 13th May, but now—in the face of demands for more—Dowding called a halt, for approximately a third of our fighter strength, including about forty per cent of our regular fighter pilots, had been deployed overseas.

During the first seven days of the offensive in the north, the Air Component Hurricanes destroyed between sixty and seventy enemy aircraft, losing twenty-two of their own in combat (but saving seven of the pilots). A further fifteen Hurricanes were damaged on the ground. As a result squadrons were either recalled or amalgamated to the extent that by 17th May only three squadrons existed at anything like operational strength in the north. The end of the Air Component was near. On 21st May the remaining pilots and aircraft were ordered to return to bases in Southern England whence, under a new Headquarters at Lympne, they continued to provide what cover they could.

*Hurricanes of another Air Component squadron, No. 87. Taken in March 1940, this photo shows at least three aircraft fitted with D.H. three-blade propellers.*





*Hurricanes of No. 85 (Fighter) Squadron at Merville during the German offensive in the Low Countries.*

It was at this juncture that home-based Hurricanes and Spitfires (not previously engaged in France) were ordered off to prevent the *Luftwaffe* from destroying the retreating B.E.F. Some Hurricane squadrons, as yet hardly blooded, found themselves in the thick of the battle from the start. No. 32 (F) Squadron, based at Biggin Hill and flying Hurricanes with Rotol propellers, went into action on 19th May over Cambrai against Messerschmitt Bf 109E and Bf 110 fighters escorting a single Dornier Do 215. For the loss of one pilot (who later managed to make his way by ship

to England), the squadron destroyed the bomber and six of the escorting fighters. Three days later the same squadron scored a similar victory; patrolling between Calais and Boulogne and led by Sqdn. Ldr. John Worrall, it came across eight Bf 109E's and shot down six without loss.

No. 79 (F) Squadron, which had been ordered from Biggin Hill to reinforce the Air Component on 10th May, now returned to its home base. Six of its eighteen pilots had been killed or were missing, and its Hurricanes now stood burnt out on Merville aerodrome. Both 79 and 32 Squadrons

*Hurricanes in France during a practice gas attack.*



were ordered to the north of England to re-equip and rest, their place at Biggin Hill being taken by three new Hurricane squadrons, Nos. 213 and 242 to cover the B.E.F., and No. 229 for home defence. They arrived on 26th May, the day the great evacuation from Dunkirk started. Though other Hurricanes and Spitfires were heavily engaged on the 27th, it was not until the following morning that either of the two new Biggin Hill squadrons went into action. Taking off at 5 a.m., twelve pilots of No. 213 were briefed to escort Blenheims bombing St. Omer, and afterwards to patrol between Gravelines and Nieuport. Coming across an escorted formation of Heinkels, they destroyed one of the escort for the loss of two Hurricanes (one of the pilots returning later). After breakfast the Squadron's fortunes changed and the ten remaining Hurricanes set out to cover the Dunkirk beaches, arriving just in time to find a large formation of Heinkels and Junkers, escorted by Messerschmitts, starting to attack our troops. Seven enemy aircraft were destroyed for the loss of one Hurricane pilot; another pilot, Sgt. Butterfield, alone destroyed a Junkers Ju 88, a Messerschmitt Bf 110 and two Bf 109E's. The Squadron was airborne again in the afternoon, though now they sighted nothing.

Throughout the evacuation this tempo was maintained by almost all the squadrons, each often airborne five or six times in a single day. The evacuation lasted nine days and during this period Nos. 213 and 242 Squadrons destroyed twenty-six of the enemy for the loss of nine Hurricanes and five pilots. Such a record was commonplace among the Hurricane and Spitfire squadrons, yet at no time were more than 160 fighters serviceable; they flew 2,519 sorties in direct support of the evacuation and destroyed well over a hundred of the enemy for the loss of thirty-two pilots.

But while the British Expeditionary Force had fought its way out of France at Dunkirk there still remained a fortnight before the Battle of France was over. The A.A.S.F. had, between 16th May and 2nd June, been fighting from eight airfields south-east of Paris, though the fighter squadrons had often operated from a larger number of widely dispersed grass strips all over central and northern France. During this period the remaining Battles, Blenheims, Lysanders, Gladiators and Hurricanes continued to cover the Allied armies being forced back on Paris, until no more than eighty aircraft (among them more than thirty Hurricanes) remained airworthy. It was on 27th May that No. 501 Squadron fought what must surely rank as one of the greatest air battles ever fought by

Hurricanes, having due regard for the conditions under which the Unit had been operating.

27th May 1940. Squadron based at Anglure (50 miles east of Paris), operating from forward strip at Boos (5 miles south of Rouen). Thirteen Hurricanes were airborne at 1345 hrs, led by Fg. Off. E. Holden, briefed to patrol the area Abancourt—Blangy (30 miles north-east of Rouen). Intercepted twenty-four Heinkel He 111K's escorted by twenty Messerschmitt Bf 110's. Eleven Heinkels definitely destroyed, three Heinkels and one Messerschmitt possibly destroyed. Fg. Offs. J. R. Gridland and E. Holden, Plt. Offs. J. A. A. Gibson, D. A. Hewitt, R. G. H. Hulse and K. N. T. Lee, Sgts. R. C. Dafforn, J. H. Lacey, A. A. Lewis and D. A. S. McKay all destroyed one Heinkel each, while Plt. Off. Gibson and Sgt. Dafforn also destroyed another between them.

The damaged aircraft were claimed by Plt. Off. E. J. H. Sylvester, who fired off all his ammunition into a Messerschmitt, which was seen falling by Sgt. P. C. Farnes, who fired further rounds into it. Sgts. Lacey and McKay also attacked two other Heinkels which started losing height, with their undercarriages down, and streaming smoke. Plt. Off. Hewitt also saw another Heinkel falling after he had attacked it.

It should be noted that this was the first combat for Plt. Off. Hewitt and Sgt. Lewis, who had both newly joined the Squadron. Our own machines suffered hardly any damage in the above encounter, all pilots returning safely.

On 3rd June the remnants of the A.A.S.F. were ordered to withdraw to six strips south-west of Paris. Such was the fury of combat and the high rate of loss incurred that by 15th June almost all but the Hurricanes had been destroyed or ordered home. The fighters were now moved north and westwards to cover the remaining evacuation ports, and for this purpose two further Hurricane squadrons, Nos. 17 and 242, were temporarily despatched from the United Kingdom. Nos. 1, 73 and 242 Squadrons were deployed to defend Nantes, Brest and St. Nazaire, and from these ports most of the remaining British forces sailed before the fighters were ordered home on 18th June. (In fact, almost all the Hurricanes had to be destroyed on their French airfields either due to unserviceability or lack of fuel.) For St. Malo and Cherbourg, Nos. 17 and 501 Squadrons flew cover, first operating from Dinard and later from the Channel Islands.

The German invasion of France and the Low Countries had cost the enemy dear, but it will never be known exactly what share of the 1,284 aircraft lost by the *Luftwaffe* fell to the guns of the

## THE HAWKER HURRICANE



*Pictured with members of the German forces and surrounded by enemy Heinkels and Junkers, this almost-new Hurricane, P3541, was one of many abandoned on Merville airfield in 1940. Apart from attempts to strip the fabric from the rear fuselage and to retract the undercarriage, this Hurricane displays only superficial damage and could well have provided up-to-date information on R.A.F. equipment such as the Rotol propeller.*

R.A.F. Certainly the Hurricanes had not been found lacking in any important combat quality, yet their effort had taken grievous toll. With the Air Component, the equivalent of thirteen Hurricane squadrons had flown 261 Hurricanes; of these, seventy-five had been shot down or destroyed on the ground by enemy action, and one hundred and twenty were unserviceable or lacked fuel and were burnt on their airfields. Only sixty-six were flown home to England, so that during the ten days' fighting by the Air Component alone the R.A.F. lost 195 Hurricanes, or about a quarter of our total fighter strength. To this must be added

the losses of the A.A.S.F.—a further sixty-six Hurricanes—while Fighter Command itself had lost 219 fighters of all types.

Yet this alarming loss of 477 fighters, disastrous as it was, could not compare with the loss of so many of our pilots for, whereas fighters were already being built at the rate of over 400 every month, the trickle of newly-trained pilots as yet reaching the squadrons could not counter the forfeit of experience gained by so many Regular pilots. It was their loss that was to cause most anxiety and bring Britain so near the brink of disaster during the coming four months.

## THE BATTLE OF BRITAIN

### Anticipation and Preparation

The months of June and July 1940 must surely rank as among the darkest months Britain has ever known. Her army had suffered disastrous losses in material at Dunkirk, and her exhausted soldiers were forced to rest after their grim ordeal. Germany controlled or was about to control the entire European seaboard from north Norway to the Spanish border. German bombers possessed bases no more than twenty minutes' flying time from British ports and cities, while hundreds of British fighter aircraft lay wrecked, abandoned in France. These were the months of apprehension and anticipation, of preparation for what must inevitably be a battle for the final subjugation of Germany's traditional enemy.

*Reichsmarschall* Göring was aware that the metropolitan fighters of the Royal Air Force had not yet been fully committed in battle and that, before any amphibious or aerial invasion could be undertaken, the ability of the R.A.F. to defend its homeland must be eliminated. These fundamentals had not, of course, escaped Lord Dowding who, many months before in the face of strong military and political pressure, had successfully resisted demands for greater fighter strength to be deployed in France at the expense of his home defences. Yet the Battle of France and the evacuation of our army from Dunkirk had taken heavy toll. Apart from the loss of 477 fighters by Fighter Command, the A.A.S.F. and the Air Component—which it was hoped would be replaced quickly—many of the most experienced Regular pilots had not returned home. The *Luftwaffe*, on the other hand, had suffered less severely in relation to its strength and, apart from sporadic nuisance raids and reconnaissance sorties which it carried out more for experience and training than anything else, was establishing bases from which it would

now send its bombers against these shores.

Had Göring chosen, or indeed been able to launch his main air attacks on Britain a month earlier than he did, his bombers would have encountered far less resistance. One third of the front line strength of Hurricanes and Spitfires had been lost immediately before or during the Dunkirk evacuation, and of the fifty-two fighter squadrons deemed to be the minimum necessary for the defence of the country, only thirty-six were combat-ready on 7th June. Nineteen of these were Hurricane-equipped, and seven others were working-up.

Furthermore, the figure of fifty-two squadrons had been estimated as being the defence necessary against an air force based only in Germany, and the radar defences had been designed to give warning of the approach of such a threat. Now, with one *Luftflotte* (Air Fleet) based in Norway, one in the Low Countries and north-east France, and a third in north-west France, the air defence flank could be turned by attacks on Britain's vital sea ports.

These, then, were the omens which faced this island during those summer months of 1940. The country had turned for leadership in the direction from which stern warning of such a situation had come long ago in October 1934. Winston Churchill accepted office as Prime Minister and he, by his now-legendary powers of leadership, inspiration and oratory, evoked a fierce determination to stand and fight back.

Increased production of fighters was undoubtedly of paramount importance, no less than the training of more young pilots. Production planning had, until now, been the responsibility of the Air Ministry and a programme had been laid down in January 1940 calling for the construction of 8,750 aircraft during the next seven

## THE HAWKER HURRICANE

*Right: Many aircraft of Fighter Command displayed black and white undersides, as seen on this Hurricane, P3408.*

months, of which 1,769 were to be fighters. Known as the Harrogate Programme, this seemed an imaginative target, yet there lacked an integrated *force majeure* from which a commercial industry could achieve the administrative stimulus to ensure the efficient co-ordination necessary for such a production effort. Therefore on 12th May 1940 the production planning departments of the Air Ministry were detached from their parent body and formed into an autonomous Ministry of Aircraft Production (M.A.P.) under the dynamic leadership of Lord Beaverbrook.

At once production returns showed an increased acceleration, particularly in the figures for fighters and, during the seven months up to the end of August, all targets had been passed:



	<i>Planned Production by the Harrogate Programme, laid down January 1940</i>	<i>Actual Production achieved, February to August 1940</i>
All types . . . . .	8,749	8,796
Fighters . . . . .	1,769	2,317
Hurricanes (from all U.K. factories) . . . . .	1,045	1,373

Such a record must stand as tribute to the organising genius of Lord Beaverbrook, but no less than to the determination of the thousands of men and women in the factories who transformed target figures into reality.

However, the supreme test of determination, courage and skill now, in June 1940, faced the pilots of those fighters, awaiting the inevitable battles with an enemy flushed with recent victories over the air forces of all Europe.

Fighter Command was hurriedly re-equipping the Squadrons that had been so badly mauled in the Battle of France and was speeding-up the formation of fresh units. The rate of issue of aircraft to these squadrons may be gauged by the fact that on 20th May there were 120 Hurricanes at Maintenance Units and Aircraft Storage Units; by the beginning of June the M.U.'s were empty of combat-ready Hurricanes and only twelve remained at A.S.U.'s, awaiting collection by ferry pilots. Moreover, new aircraft were by no means the only ones being issued to the squadrons; Hurricanes of the first production batch (many still fitted with fabric-covered wings) were "milked" from Station Flights at Northolt and Andover for issue to operational units. Never-

theless, by and large, these ancient machines had been relieved by newer aircraft and despatched northwards by the time the Battle started in earnest in August.

It is convenient here to record the features of the Hurricane Mark I fighter which was in production at the Hawker and Gloster factories during the period April–August, 1940, for these were the machines which formed the greater part of Fighter Command throughout the Battle of Britain, and a number of apparently conflicting accounts and descriptions of the Hurricane have appeared from time to time.

It had been planned to withdraw all fabric-wing and wooden-airscrew Hurricanes from service with operational units by May 1940, and this programme was well under way when the losses incurred in France brought about the return of many of the older machines to the squadrons. Records show that on July 4th a total of eighty-two Hurricanes possessed fabric-covered wings on combat-ready squadrons, together with thirty-six with wooden propellers. By 16th August these figures had dropped to twenty and fifteen respectively. The standard Hurricane I on strength in the United Kingdom was powered by a Merlin

III driving either a Rotol or de Havilland variable-pitch three-blade propeller. Only on one occasion were wooden propellers fitted to replace metal airscrews, and this occurred when "A" Flight, No. 32 (Fighter) Squadron at Biggin Hill was ordered to return an experimental batch of Constant Speed Units to the manufacturers. Twenty-four hours later all the aircraft were fitted with Rotol propellers again.

The standard Hurricane I was armed with eight 0.303-inch Browning machine guns and all new squadron aircraft were so fitted. However, later in the Battle, due to the necessity to clear a small number of superficially-damaged Hurricanes from the bombed premises of Rollasons, about four Hurricanes were issued direct to a Squadron (among them *P3451* and *P3530* issued to No. 56 (Fighter) Squadron at Rochford) with only six guns apiece. One other aircraft with non-standard armament deserves mention here; this was a Hurricane I which, having been damaged in the outer wings had been returned to Hawkers for repair. The company was, however, pursuing a proposal to increase the armament to four 20-mm. Oerlikon guns and gained permission to perform a trial installation in this machine. After trials at Langley and Boscombe Down the aircraft was delivered to No. 151 (Fighter) Squadron on 19th August at North Weald. Although this aircraft performed no recorded part in the Battle, its significance in other directions is discussed on Page 80. The only other Hurricane armed with cannon at the time of the Battle of Britain was the old twin-gun Merlin II-powered trials aircraft, *L1750*, which languished in a hangar on Martlesham Heath from May 1940 onwards, until eventually scrapped.

Much has been written about the Hurricane's performance capabilities in 1940. These are set down on Pages 141–152 for each variation of the aircraft. It would be naïve to claim that the Hurricane I was equal in speed to the Messerschmitt Bf 109E or the Supermarine Spitfire at the rated altitudes of these other fighters; yet *at its own rated altitude* of slightly above 15,000 feet the Hurricane was at least a match for any German fighter during the Battle *provided the enemy did not start with an altitude advantage*. Moreover if, as often occurred, the enemy chose to break off an engagement by diving away, its acceleration was such—due to lower drag—that the Hurricane was almost powerless in pursuit. Therefore it was customary, on account of this admitted inferiority, to send the Hurricane formations principally against the German bombers

which seldom operated above about 17,000 feet, while the faster-climbing Spitfires tackled the escorting Messerschmitts which approached at a higher altitude. Unfortunately it was seldom possible to spare—or indeed arrange in the heat of battle—formations of both Hurricanes and Spitfires to carry out co-ordinated attacks. The result was that if Hurricanes attacked the bombers, the escorting fighters joined the fight from above; or, alternatively, if Spitfires intercepted the fighters, the bombers carried on below unmolested. It soon became evident however that, with the exception of the Messerschmitt Bf 110 C which proved disappointing to the *Luftwaffe* in any case, the escorting German fighters possessed only marginal fuel reserves to accompany the bombers, and if the escort could be brought to combat early, it would be obliged, through shortage of fuel, to turn for home thus leaving the bombers relatively vulnerable to interception by the Hurricanes.

Regarding the maximum speed of the Hurricane Mark I with Merlin III and three-blade variable-pitch propeller, the oft-quoted speed of 305 miles per hour—attributed to Lord Dowding himself—can only be taken to have referred to repaired aircraft. Performance checks, carried out from time to time both at Boscombe Down and Brooklands on *new* aircraft, indicated maximum speeds ranging between 320 and 328 miles per hour at rated altitude, the actual speed being roughly proportional to the degree of skill and care used in the finishing shops at the various factories. It can be stated with certainty that no new aircraft was delivered in so poor a condition that it imposed a twenty mile an hour penalty! Repaired aircraft were rather different for, apart from the conditions under which some of the repair units operated (and no criticism is inferred on the skill and enthusiasm which abounded), the use of unmatched components often imposed excessive trim corrections which in turn reduced the maximum speed attainable with comfort.

Nevertheless, despite the slight inferiority of the Hurricane in terms of performance, it was not found lacking in other respects and its great strength and ability to withstand battle damage endeared it to the hundreds of R.A.F. pilots whom it carried in those hectic days of 1940.

### The Preliminary Phase

While units of the A.A.S.F. still struggled to extricate themselves from north-west France, the *Luftwaffe* turned its attention to fringe targets in the United Kingdom, principally on or near the

## THE HAWKER HURRICANE

East Coast. From 5th June, and almost every day or night for two months, small numbers of German bombers, operating from the Low Countries, ranged over Britain, seldom causing significant damage but deriving valuable operational and navigational experience and causing much inconvenience and apprehension by their very presence.

By and large the Germans preferred, during this period, to operate by night, as fighter bases, from which escorts could be provided, had yet to be established within range of any but the coastal targets. To begin with some efforts were made to intercept these night raids using Hurricanes and Spitfires from the day fighter squadrons, but these efforts reaped little reward and, with the absolute urgency afforded to the build-up of our daylight defences, the operations were soon discontinued.



*9th January 1940 and the first Canadian-built Hurricane, P5170, ready for its first flight at the Fort William Works of the Canadian Car and Foundry Co. Ltd. Canadian Hurricanes fought at the end of the Battle of Britain.*

Apart from the fact that radar cover over England was almost non-existent, the wastage of fighters resulting from accidents due to inexperience in night operations created an intolerable strain on our resources. In some respects the advent of the major daylight assaults in place of the night attacks came as a relief to the defences of this country.

However, as General Sperrle's *Luftflotte 3* became established in north and north-west France, this preliminary phase took a more dangerous turn at the beginning of July. Not yet willing to attempt a daylight penetration in force of the coastal defences, German bombers, now often heavily escorted, started determined attacks on British coastal convoys sailing through the English Channel. The greater proportion of our essential shipping was now routed into the Western Ports, yet a number of small but important convoys still made for Plymouth, Portland,

Southampton, Dover, Harwich and London, and although these sailed well under the cover of the recently-established radar chain on the South Coast, our fighters had to maintain constant standing patrols over the slow-moving ships.

As much in the hope of inflicting serious losses on our shipping (and perhaps of more significance in view of the proposed invasion, the Royal Navy) as of bringing our main fighter forces into action, the Germans persevered throughout July; often a patrol of half-a-dozen Hurricanes or Spitfires would find itself beset by forty or fifty enemy fighters, while a similar number of Junkers Ju 88's or Heinkel He 111's staged a lightning raid on the vessels. Too often the raiders would be on their way home by the time reinforcements could reach the patrol.

Convoys were, as they approached the Straits

of Dover, provided with rather stronger fighter cover and several major air battles took place in this area—witness a fight on 20th July; in this, enemy aircraft fell in with two whole squadrons of R.A.F. fighters—one of Hurricanes (No. 32 again) and one of Spitfires (No. 610). No. 32 Squadron's diary recorded:

Biggin Hill—20th July 1940. Convoy escort, 10 miles east of Dover. At 17.58 hours with 610 Squadron, intercepted a raid on the convoy by about fifty Junkers Ju 87's and Messerschmitt Bf 110's, escorted by Messerschmitt Bf 109E's. Led by S/L Worrall the Squadron shot down six of the enemy (3 Bf 110's, 2 Bf 109E's and 1 Ju 87) and damaged four others (all Bf 109E's). One Hurricane was lost but the pilot, F/Lt. Bulmer, is reported to have baled out near North Foreland. Sgt. Higgins was slightly wounded in the face by splinters from bullets striking his protecting armour.



*Above: Three Hurricanes of No. 32 (Fighter) Squadron taking off from Biggin Hill. Below: No. 56 (Fighter) Squadron operating from a forward airfield.*

This phase was inconclusive in so far as the Germans were unable to stop the movement of coastal shipping, nor did they inflict crippling losses on the R.A.F. More often than not, the provision of standing patrols did not allow the fighters to operate in large formations yet, despite the difficulties under which our pilots flew and fought, they destroyed 186 enemy aircraft in defence of the convoys during July and the first week in August, for the loss of forty-six Hurricanes and thirty-two Spitfires (of which the pilots of twenty-eight were saved). Against these figures must be set the loss of shipping, for the German bombers sent some 40,000 tons to the bottom. (A similar figure was achieved at far lesser cost by German minelaying in the approaches to our seaports.)

### **The Battle Opens**

By the beginning of August the German plans for the all-out assault on Britain had been com-

pleted and operation orders were issued to the three *Luftflotten* on 2nd August. The date set for the great *Adlerangriff*—or Eagle Attack—was to be August 10th, the initial aim being to prevent the R.A.F. from interfering with subsequent *Luftwaffe* attacks by destroying coastal fighter airfields and radar stations.

The enemy's plan to launch his main attack on 10th August was frustrated by bad weather and although German records afterwards showed that the planned attack started during the afternoon of 13th August, such were the efforts made on the 11th and 12th that, from Fighter Command's viewpoint, the Battle proper opened much sooner.

To the R.A.F. it appeared at the time that the assault started on 8th August, for on that day *Luftflotten* 2 and 3 operated in great strength against convoys off the Isle of Wight and Dover, operations which cost them about twenty-eight aircraft. Fighter Command's losses amounted to twenty aircraft of which twelve were Hurricanes.



**PRINCIPAL FIGHTER COMMAND AIRFIELDS**

**BATTLE OF BRITAIN, Aug.-Sept., 1940**

**LEGEND**

- Main Fighter Command Airfields
- Satellite & Other Fighter Airfields
- + Luftwaffe Airfields

*The names of the principal Hurricane bases are underlined.*

**Map Labels:**

- Geographical Features:** IRISH SEA, NORTH SEA, BRISTOL CHANNEL, ENGLISH CHANNEL.
- Airfield Groups:** NO. 13 GROUP, NO. 12 GROUP, NO. 10 GROUP, NO. 11 GROUP.
- Airfield Names:** Turnhouse, Prestwick, Aldergrove, Acklington, Usworth, Catterick, Church Fenton, Ringway, Ternhill, Wittering, Collyweston, Duxford, Martlesham, Debden, North Weald, Hendon, Horchurch, Rochford, Northolt, Crowdon, Biggin Hill, Kenley, West Malling, Manston, Westhampnett, Tangmere, Lympne, Huskisson, Enderbury, Warmwell, St. Eval, Roborough.
- Luftflotte Positions:** LUFTFLOTTE 1, LUFTFLOTTE 2, LUFTFLOTTE 3, LUFTFLOTTE 5 (Scandinavian bases).

On 8th August, *Luftflotte 3* opened the air assault by sending a formation of Junkers Ju 87

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# THE BATTLE OF BRITAIN

## R.A.F. FIGHTER COMMAND FIRST LINE STRENGTH 8th AUGUST 1940

	Hurricanes	Spitfires	Blenheims	Defiants	Gladiators
<b>No. 10 Group</b>					
3 Hurricane Squadrons	59	—	—	—	—
4 Spitfire Squadrons	—	71	—	—	—
1 Blenheim Squadron	—	—	12	—	—
1 Gladiator Flight	—	—	—	—	8
<b>No. 11 Group</b>					
13 Hurricane Squadrons	238	—	—	—	—
6 Spitfire Squadrons	—	100	—	—	—
2 Blenheim Squadrons	—	—	28	—	—
<b>No. 12 Group</b>					
5 Hurricane Squadrons	87	—	—	—	—
6 Spitfire Squadrons	—	103	—	—	—
1 Defiant Squadron	—	—	—	14	—
2 Blenheim Squadrons	—	—	29	—	—
<b>No. 13 Group</b>					
7½ Hurricane Squadrons	143	—	—	—	—
3 Spitfire Squadrons	—	47	—	—	—
1 Defiant Squadron	—	—	—	12	—
1 Blenheim Squadron	—	—	13	—	—
<b>TOTAL STRENGTH:</b>	527	321	82	26	8
<b>TOTAL AVAILABLE AT OPERATIONAL SERVICE- ABILITY RATE OF 75% AVERAGE:</b>	400	240	60	20	6

## LUFTWAFFE OPERATIONAL STRENGTH—N.W. EUROPE 8th AUGUST 1940

	<b>LONG RANGE BOMBERS</b> Serviceability Rate: 70%	<b>DIVE BOMBERS</b> Serviceability Rate: 80%	<b>SINGLE-ENGINE FIGHTERS</b> Serviceability Rate: 90%	<b>TWIN-ENGINE FIGHTERS</b> Serviceability Rate: 80%
<b>LUFTFLOTTE 2</b> (Bases in Holland, Belgium and N.E. France)				
ESTABLISHED STRENGTH	600	60	460	90
SERVICEABLE STRENGTH	420	50	400	70
<b>LUFTFLOTTE 3</b> (Bases in N.W. France)				
ESTABLISHED STRENGTH	600	220	300	130
SERVICEABLE STRENGTH	420	180	270	100
<b>LUFTFLOTTE 5</b> (Bases in Denmark and Norway)				
ESTABLISHED STRENGTH	130	—	—	30
SERVICEABLE STRENGTH	90	—	—	25
<b>TOTAL ESTABLISHED STRENGTH</b>	1,330	280	760	250
<b>CHURCHILL'S QUOTED ESTIMATE</b>	1,015	346	933	375
<b>APPROXIMATE TOTAL SERVICEABLE EFFORT</b>	930	230	670	195

## THE HAWKER HURRICANE

enemy dive bombers, losing three of their number to the escort. No. 608 Squadron's Spitfires engaged the Messerschmitts, destroying two but losing two.

Meanwhile *Luftflotte 2* was engaged in two attacks to the east, one directed against Dover harbour and one on a coastal convoy bound for the Thames Estuary. Six Hurricane squadrons, Nos. 32, 56, 85, 151, 501 and 615, reacted (No. 32 Squadron flying twice). These raids were carried out by Ju 87's, Ju 88's and Heinkel He 111's with a heavy escort of Bf 109's, the Hurricanes destroying six for the loss of six, and Spitfires of Nos. 54 and 65 Squadrons shooting down six, losing four. A few other isolated raids were intercepted along the South Coast that day and the total confirmed victories amounted to 14 by Hurricanes and 8 by Spitfires, though it appears from German records that a further six did not reach their bases. Three of the twenty R.A.F. pilots shot down were saved.

As already remarked bad weather intervened to upset Göring's *Adler Tag* plans for the 10th. Nevertheless both *Luftflotten 2* and 3 launched moderately heavy attacks on the 11th, the former again attacking Dover—this time in four raids. These were met by small sections of Hurricanes from Nos. 1, 17, 32, 56, 85 and 111 Squadrons, which shot down eleven of the enemy, losing nine of their number; Spitfires from Nos. 64, 65 and 74 Squadrons destroyed five for the loss of three. No. 111 Squadron's Hurricanes—on the point of attacking a large formation of bombers—were attacked from above by escorting Bf 109E's and lost five aircraft, only managing to shoot down one enemy aircraft.

The most determined raid that day was against the naval base at Portland and was carried out by thirty-eight Ju 88's of *Luftflotte 3*, escorted by about thirty Bf 110's. Sixteen Hurricanes from Nos. 87, 213 and 238 Squadrons, together with ten Spitfires of Nos. 152 and 608 Squadrons intercepted, broke up the raid and destroyed nine of the enemy for the loss of five British fighters.

It was probably the fact that the German formations were so promptly intercepted by our fighters in all their attacks on the 11th that efforts were made the following day to destroy the key radar stations in the south and east, which were so patently providing advance information on enemy raids. Heavily escorted dive bombers of *Luftflotte 3* attacked the Type 1 radar station at Ventnor on the Isle of Wight, causing so much damage that it was off the air until 23rd August. The same air fleet attacked Southampton and Portsmouth throughout the day, intercepting Hurricanes of Nos. 32, 43, 145, 238 and 601 Squadrons shooting down seventeen Ju 87's and two Bf 110's. Spitfires destroyed a further six.

Meanwhile *Luftflotte 2* combined raids on the airfields of Kent at Manston, Lympe and Hawkinge with attacks against neighbouring radar stations. Manston was put out of action temporarily as a result of an attack carried out just as Spitfires of No. 65 Squadron were taking off, while Lympe and Hawkinge were so badly hit that only small sections of their runways remained usable.

Whereas on this day, the eve of the enemy's planned assault, thirty-six German aircraft failed to return home—for the loss of twenty-two British

*A Hurricane of No. 32 (Fighter) Squadron taxiing out from Dispersal at Kenley.*





*A photograph taken on 15th August 1940 showing two Hurricanes of No. 501 (County of Gloucester) Squadron scrambling from Gravesend. The hangars in the background bear signs of previous German visits.*

fighters (13 Hurricanes, 6 Spitfires and 3 Blenheims, of which the pilots of ten were saved), there must be set the temporary loss of an important radar station and severe damage to four others, while three of our key forward airfields would, for some days at least, only operate at reduced efficiency. Had this damage been appreciated by the enemy, Göring must surely have persevered against the British warning system, for therein lay the defence's heel of Achilles.

The much-vaunted raids of the 13th achieved little success, the intended targets being well inland. The radar continued to give warning of the German formations and, despite cloud cover during much of the day, the Hurricanes and Spitfires destroyed forty-seven of the enemy for a loss of thirteen. Rochford, base of No. 56 Squadron's Hurricanes, had been selected for attack but escaped unscathed. That night the *Luftwaffe* departed from its customary programme of minelaying under cover of darkness and sent bombers to attack factories engaged in producing fighters for the R.A.F. Only the Nuffield plant at Castle Bromwich (building Spitfires) was damaged, and though raids were mounted against similar targets, most aircraft factories escaped. Neither Hawkers nor Glosters, with their Hurricane lines, were hit, although several vain attempts were made to find the latter.

The 15th August dawned fine, the weather that Göring required for a concerted attack in unison by all three *Luftflotten*. Kesselring and Sperrle had suspected that the stiff fighter opposition, which

had been encountered by their formations in the south, had been achieved by stripping the North Country of its fighter defences. Stumpff, however, was to be sadly disappointed if he expected his bombers, flying from Scandinavian airfields, to escape lightly.

First major attack of the day developed over Kent at about 11.30 a.m. when about one hundred Ju 87's and Bf 109's crossed the coast between Dungeness and Dover, and attacked the forward airfield at Lympne. Another formation which approached was repulsed before it reached our shores—due largely to determined interceptions by Hurricanes of No. 501 Squadron flying from Gravesend.

It is possible that this latter raid was intended as a feint to draw more fighters into the air and thus induce further reinforcements down from the north; be that as it may, while No. 501 Squadron was scrambling from Gravesend, large formations of bombers from Stumpff's *Luftflotte 5* were approaching the north-east coast of England. Of these, radar gave valuable warning shortly after midday and soon five squadrons of fighters had commenced anticipatory patrols. Spitfires of No. 74 Squadron were first to intercept, breaking the enemy formation into small groups. One of the next into the battle was No. 605 Squadron—

Drem. 15th August 1940. Raid on Sunderland.

A red letter day. Squadron ordered off at 12.15 hrs. "B" Flight, from "available" was in the air within ten minutes. Weather fair. Big air battle off Newcastle in which it is understood



*Above and right: Variations on a theme. Arming Hurricanes on No. 601 (County of London) Squadron.*

that about 150 enemy aircraft were involved. "B" Flight, led by F/L McKellar, made contact and the ensuing fight resulted in four confirmed victories, four probables and three damaged (figures confirmed the following day) . . . it is unfortunate that "A" Flight did not make contact.

No. 73 (F) Squadron went into action a few minutes later from Leconfield,

. . . at approximately 12.57 hrs. the whole Squadron was called to "readiness" and at 13.02 hrs "A" Flight was ordered to patrol a convoy off the East Coast. When near Hornsea the Section was given a vector which brought it straight into fifty Ju 88's. The ensuing combat resulted in seven enemy aircraft being destroyed (confirmed), three unconfirmed and three damaged. All our pilots returned safely. (Sgt. Griffin visited Flamborough Head in the evening and found the wreckage of two of the Squadron's victims.)

The raid intercepted by No. 73 Squadron was the second of two attacks launched by *Luftflotte 5* that day but, apart from minor damage inflicted at Sunderland and an attack on Driffield aerodrome, neither could show much for its efforts. Indeed the harsh treatment meted out by our fighters discouraged further attacks by this *Luftflotte* during the Battle of Britain and, in time, its aircraft were distributed among the air fleets in France and the Low Countries. This of course was unknown to Fighter Command who was obliged to retain a sizeable force of fighters for the defence of the north.

Shortly after the enemy had been surprised by the strength of our fighter squadrons in the north, heavy raids were again building up in the south-east. At 2.30 p.m. a raid was reported to be approaching Harwich, and Hurricanes of No. 17 (F) Squadron (now at Martlesham Heath) were



ordered up to intercept. Unfortunately they were unable to make contact and returned, only to find about 100 enemy aircraft engaged in an unopposed raid on their base.

Simultaneously about a hundred more raiders crossed in over Deal and, together with another raid of about 150, struggled on towards Rochester where they damaged the aircraft factories of Shorts and Pobjoys. All this time they were harried by sections from about ten Hurricane and Spitfire squadrons which, in the course of over a hundred engagements, claimed the destruction of about thirty German aircraft.

The next raid, this time by *Luftflotte 3*, was the biggest of the day. At 5.30 that afternoon between two and three hundred enemy raiders in seven formations approached the coasts of Hampshire and Dorset. Hurricanes of Nos. 87, 213, 238 and 247 Squadrons, together with Spitfires of four others, were ordered off and succeeded in turning three of the enemy formations back, while the remainder pressed home an attack on Middle Wallop with limited success. Other raids were also launched against Croydon and despite efforts by No. 111 Squadron (from Croydon itself) and No. 32 Squadron (from Biggin Hill), damage was caused at a number of factories. One of these,

Rollasons, was engaged in Hurricane repair and several of the valuable aircraft were destroyed or damaged.

And so 15th August drew to an end. It has been described in some detail for this was the day that justified the Hurricane. It was then that almost every Hurricane squadron—built up and nurtured over the past three years—went into action to defend this country against the heaviest attack that Germany could mount. All three *Lufjflotten* had been committed, operating a total of 1,790 sorties against these shores and, for a loss of seventy-five or so aircraft, could claim to have damaged four or five factories and three airfields. On the other hand the R.A.F. lost thirty-four fighters (including eleven Hurricanes) in the air, and a further ten bombers on the ground at Driffild. Seventeen of our fighter pilots were saved.

The following day this scale of attack was maintained, though now *Lufjflotte 5* was absent. Three major raids, all heavily escorted, were launched. The first, at midday, fell upon airfields in Kent. Shortly afterwards a number of formations from *Lufjflotte 3* penetrated the Hampshire coast to attack inland airfields (at one of these, No. 8 Maintenance Unit, Brize Norton, twenty-eight Hurricanes were among forty aircraft destroyed when two Ju 88's placed some well-aimed sticks of bombs on the hangars). The third phase materialised in the evening and a number of formations attacked over a two hundred mile front from Suffolk to the Isle of Wight.

It was also during the course of the second raid on the 16th that a Hurricane pilot gained the singular distinction of winning the award of the Victoria Cross, the only occasion that the supreme decoration has been won by a pilot of Fighter Command. Flt. Lt. J. B. Nicholson was a member of No. 249 (Fighter) Squadron which had been formed at Church Fenton with Spitfires in May 1940, but which had changed during the following month to Hurricanes. The Squadron had flown about 1,000 hours in working up during June and had gained its first victory in shooting down a Ju 88 over Aldbrough on 6th July. By 16th August No. 249 had moved south to Boscombe Down and when, on that day, the south coast radar reported the approach of the large formations towards Hampshire the Squadron was ordered off to patrol between Ringwood and Poole. In the course of this patrol Red Section, led by Nicholson, was detached to investigate a formation of Bf 109E's over Southampton. However before an attack could be initiated the Section was "bounced" from

behind by a number of Bf 110's and straightway Nicholson's Hurricane was hit by four 20-mm. shells, two of which struck the pilot and a third ignited the reserve fuel tank forward of the cockpit. Fire at once engulfed the machine and Nicholson made hasty preparations to bale out. However through the flames and smoke he caught sight of the German aircraft which had apparently overshot its target and was now ahead. Despite his shell wounds and severe burns on his hands, legs and face, Nicholson remained in his cockpit long enough to bring his sights to bear and with a long burst succeeded in forcing the enemy fighter down out of control. Abandoning his own stricken aircraft, he made an agonising though successful parachute descent, only to be fired upon by a member of the Local Defence Volunteers just before reaching the ground. He was taken to the Royal Southampton Hospital where he recovered from his wounds to receive that coveted medal for gallantry.

The Battle of Britain went on; day after day huge enemy formations were reported approaching the coast in those almost cloudless skies. Time after time our fighters took off to intercept. Sometimes, through sheer weight of numbers, the Heinkels and Dorniers would break through to drop their bombs on the closely-packed vital targets in the south-eastern counties. For example, on 18th August an enemy formation managed to reach the important Sector fighter airfield at Kenley where, in spite of all that Hurricanes of No. 111 Squadron and Spitfires of No. 64 Squadron could do, it destroyed every hangar but one and heavily damaged the runways.

Yet as the Battle progressed certain encouraging facts were emerging. From his early experiences Göring had learnt that his much-vaunted dive bombers were fatally vulnerable in the presence of determined fighter opposition, and the Ju 87 came to be encountered less and less. More reliance was placed on the Messerschmitt Bf 110C in the fighter-bomber role since it was felt that this aircraft, once relieved of its bomb-load, could hold its own if faced by intercepting fighters.

Operating as they did at heights below 18,000 feet, the Bf 110's were often intercepted by Hurricanes rather than by Spitfires and although the enemy usually adopted a characteristic defensive circle when attacked, the Hurricanes did great execution among the enemy machines.

Undoubtedly the fiercest Hurricane v. Bf 110 battle was that fought over Hawker's factory at Brooklands on 4th September. Twenty-two Hurricanes of Nos. 249 and 253 Squadrons were already



*Hit by an enemy explosive shell in the rear fuselage, as well as by small calibre bullets in the wing, this Hurricane of No. 615 (County of Surrey) Squadron was flown back and landed safely at Kenley.*

airborne when they were diverted to deal with a formation of Bf 110's which had penetrated the coastal patrols. No. 253 Squadron's diarist recorded a graphic description of his pilots' encounters—

Kenley, 4th September 1940. Nine Hurricanes took off from Kenley at 13.05-13.10 hrs to patrol base and Croydon at 8,000 feet. They were flying squadron Vic formation when they sighted twenty Bf 110's about to attack Brooklands aerodrome. Leader turned the formation ninety degrees to starboard and in shallow Vic dived to the attack out of the sun from about 12,000 feet. Flt. Lt. Cambridge, leading the formation, attacked an enemy aircraft from the beam and above expending all his ammunition in one long burst and saw the target's port engine catch fire. Blue One followed it down and saw it crash in flames in a field. Blue Two (Plt. Off. Samolinski) attacked another and observed a fire in the cockpit, after which the enemy aircraft turned and went into a dive. Green Two (Sgt. Dredge) attacked a Bf 110 from thirty degrees above and to the rear, giving a ten second burst while closing from 300 down to 25 yards. Both engines caught fire and a red glow was observed in the cockpit; the enemy was seen to dive straight down and burst into flames (confirmed by Red One). Green Three (Plt. Off. Novak), after attacking Bf 110 observed smoke coming from the fuselage, after which the enemy dived and crashed. Red One (Flt. Lt. Wedgwood) succeeded in getting on the tail of a Bf 110 and fired a ten second burst from

250 yards to point blank range. The enemy caught fire, climbed steeply for a second before falling to crash in a wood. Red Two (Plt. Off. Corkett) attacked a Bf 110 which was flying on the starboard side of the enemy Vic; after two bursts the enemy broke formation, climbed 500 feet, turned over on to its back and dived straight down and exploded in a field. Red Three (Sgt. Kee) delivered a head-on attack on a Bf 110 from slightly below and from 250 yards closing to 50 yards, firing 1-2 second bursts. Small pieces ripped off the fuselage and tail. Blue Three (Sgt. Innes) and Green One (Fg. Off. Watts) silenced the rear gunners of two Bf 110's. Nine Hurricanes landed at Kenley 13.55 hrs. Our losses: Nil. Enemy casualties: Six Bf 110's destroyed, one damaged.

#### **The Climax**

With London the main target for *Luftwaffe* attacks and raids on the capital being launched on 7th, 9th, 10th, 11th, 12th and 13th September, the pressure on Fighter Command airfields eased. Now whole squadrons and even wings could be committed to interception duties and switched from base to base rather more freely. Now Hurricanes and Spitfires fought the enemy formations directly over their own capital, diving away when their ammunition was exhausted—to land at one of the famous airfields on the outskirts of the Metropolis.

The climax of the daylight raids on London came on 15th September. Among the squadrons



*Pilots of No. 601 (County of London) Squadron dash to their Hurricanes after an order to scramble.*

to engage the enemy that day was No. 504 (County of Nottingham) Squadron of the Auxiliary Air Force. Based at Hendon, the pilots were brought to Readiness at eleven in the morning, just as a party of American generals (complete with cine camera) arrived to see the life of an R.A.F. fighter station for themselves. Having been introduced to all the pilots waiting at dispersal they were to witness much activity. Suddenly twelve Hurricanes were scrambled to patrol North Weald at 15,000 feet; according to an American stopwatch all

aircraft had been started up, taxied out and taken off in four minutes fifty seconds. The formation was vectored on to a raid over East London being carried out by Dornier Do 17's. Most of the Hurricanes arrived back after about an hour having shot down five of the enemy, but before the fighter pilots could have their lunch they were again scrambled, this time against a raid on South London. Three more enemy aircraft fell to the squadron's guns, but three Hurricanes did not return. Plt. Off. Jebb baled out and finished up in

*L1592, representative of the Battle of Britain Hurricane, survives to this day at the Science Museum in the markings of No. 615 Squadron, Royal Auxiliary Air Force.*



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Dartford Hospital. Sgt. R. Holmes telephoned his squadron from Chelsea to inform it of his safety and to report that he had destroyed three Dorniers! In destroying the first two he exhausted his ammunition, and then rammed a third before baling out. The enemy crashed in Victoria Station yard while Holmes landed on a roof in Chelsea—only to fall into a dustbin! During the course of air battles fought that day, Germany lost fifty-six aircraft against Fighter Command's loss of fifteen Hurricanes and eleven Spitfires.

With German losses amounting to something like seven per cent of the numbers committed, the massed raids could hardly be expected to continue for much longer. On the 17th Hitler's patience had become exhausted; after several postponements, he now finally abandoned his plans to invade Britain, at any rate until 1941. The *Luftwaffe* nevertheless persisted in its efforts to bomb London, its people and its government into surrender, though prolonged operations and continuing heavy losses inexorably reduced the weight of attacks.

The efforts of the 15th however marked more than one turning point in the battle. From then on Fighter Command's strength increased steadily,

Hurricane and Spitfire deliveries rose above the gross wastage figure. Squadrons of Hurricanes now numbered 32 against 28½ of six weeks before. By the end of September three more were to join the ranks of the defences. It is probably true to say that from the 15th September onward the *Luftwaffe* never again managed, as it had on many previous occasions, to burst through the defences by sheer weight of numbers; in other words, for the first time in Germany's bid for control of Europe, the hitherto invincible *blitzkrieg* tactics had met their match—the Hurricanes and Spitfires had confirmed and retained effective air superiority over the United Kingdom. There were, of course, to be many occasions when enemy raids penetrated the coast, but these were usually either by night or under cover of bad weather, conditions under which interception techniques were at their weakest.

Thus the Hurricane had come through the battle for which it had been conceived, though it is unlikely that anyone could have foreseen, back in 1933, the magnitude of the R.A.F. fighters' task, the odds against them or, for that matter, visualised the enormous responsibility to the World vested in their pilots.



P3395, "B-Baker" of No. 1 (Fighter) Squadron at Wittering in October 1940. The previous month this Hurricane, flying from Northolt, destroyed a Bf 109 over Tonbridge, Kent.



*After the Battle. A Hurricane of No. 229 (Fighter) Squadron has landed; its guns have been fired. The pilot is "de-briefed" by the Intelligence Officer while the steel-helmeted groundcrew replenish fuel, oil and ammunition—to be ready again.*

What of the men who achieved this victory? A book of this size can do little justice to the few hundred pilots who, in the face of mounting fatigue, took off day after day against an air force which had already shown itself superior to any other in Europe. Many books have been written about "the Few", those Englishmen who were joined by pilots from all over the World in the common fight against the German war machine; some of these men are mentioned in the combat reports quoted in this Chapter. Others who flew Hurricanes perhaps need little introduction, for their names are forever carved in the tablets of History—names like Squadron Leader D. R. S. Bader, the famous legless pilot (who is on record as having claimed the Hurricane as his favourite fighter), Group Captain A. G. Malan, a South African who finally destroyed thirty-eight enemy

aircraft, and Wg. Cdr. R. S. Tuck, to mention but a few of the Few. Yet, in all their oft-misunderstood modesty, it is certain that these great men would be the first to recognise the share taken in the achievement of that victory by the groundcrews. In these few pages some account has been given of the battles which raged high in those summer skies; there will be few stories told of the men whose work began when the fighters returned, who worked—often under fire—to re-arm the guns, to re-fuel the tanks, to patch a damaged aircraft or to clear a crashed machine from the runway, often working through the night so that the squadron should have an extra fighter for the dawn patrols. There were few decorations for these men and women. The Battle of Britain was won by every man and woman, Hurricane and Spitfire of Fighter Command.

## Chapter 7

# THE MIDDLE EAST—EARLY CAMPAIGNS

Italy's entry into the War on 10th June found British and Commonwealth air forces in North and East Africa in a somewhat parlous condition. Covering an area of over four million square miles, the Middle East Command possessed some three hundred first line aircraft, distributed between Gibraltar in the west and the Persian Gulf in the east, the Balkans in the north and Kenya in the south. Against these were ranged 1,200 home-based Italian aircraft, 282 in North Africa, 150 in Italian East Africa and about 50 in the Dodecanese.

Moreover the British fighter equipment consisted principally of Gladiators and a few Blenheims and, together with some Lysanders and Sunderlands, made up eighteen of the twenty-nine squadrons available. A remarkable collection of antique aeroplanes (among them many old Hawker biplanes) accounted for the remainder.

Having realised that the swift events in France would deprive him of significant gains in that direction, Mussolini turned his attention towards Suez, an eventuality not entirely overlooked by Air Chief Marshal Sir Arthur Longmore, Air Officer Commanding-in-Chief at Cairo. In fact, long before the Italian Marshal Graziani could concentrate his forces to launch an attack, Longmore ordered his Egyptian-based bombers against enemy airfields in Libya.

Nevertheless, under what proved to be relatively ineffective attention by our aircraft, Italian forces started to build up on the Egyptian frontier and, due to maintenance and replacement difficulties, losses by the R.A.F. began to mount. It was at this point, at the beginning of August 1940, that the Hurricane came on the scene, albeit modestly—yet in an amusing fashion.

A very early production Hurricane, believed to

be *L1669*, had been shipped out to the Sudan at the end of 1939, equipped with a desert air filter over the carburettor air intake, for tropical trials at Khartoum. In July 1940, the trials over, the Hurricane was ordered by Air Commodore Collishaw up to the front line; however its guns had long since succumbed to the rigours of the African dust and sand, so it was decided to fly the machine—dubbed “*Collie's battleship*”—from landing ground to landing ground in an attempt to lead the Italians into believing that modern fighter equipment was arriving in Egypt! Whether the ruse influenced events it will never be known, but there was a welcome and marked reluctance by the *Regia Aeronautica* to venture over our positions in any great strength.

Hurricanes *had* been despatched to the Middle East early in 1940, about ten aircraft having been shipped to Gibraltar as deck cargo. These machines had been destined for Poland in 1939, but the German invasion forestalled their delivery and they were redirected to Aden. It is thought, however, that the ship carrying them from Gibraltar was sunk; at any rate, though a quantity of Hurricane spares arrived at Aden in July 1940 (mysteriously stencilled with instructions in Polish), there was never a sign of the aircraft.

While Air Commodore Collishaw urgently requested that Hurricanes be sent out from home to join his Gladiators in Egypt, the little island of Malta was suffering at the hands of Italian bombers based at close range on all sides. From the day after Mussolini joined in the hostilities, and for three weeks, the defence of Malta rested on three Sea Gladiators—for ever known as Faith, Hope and Charity. At the end of June, however, four Hurricanes, originally shipped out to Longmore on Italy's entry into the War, were diverted to Malta and throughout July these seven



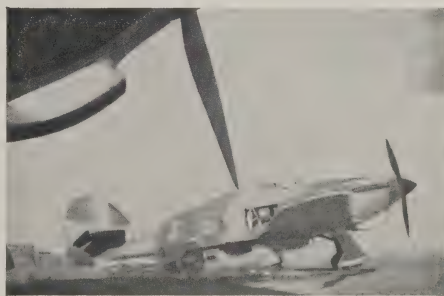
*Believed to be "Collie's Battleship", L1669, this Hurricane was the first to be equipped with faired tropical filter. It is shown here at Martlesham in 1939.*

fighters alone faced about two hundred enemy aircraft operating from Sicily. Raids were carried out on the island almost every day, and the measure of success achieved by the defences (for the loss of one Hurricane and one Gladiator) can be gauged by the fact that whereas the Italians had commenced their attacks using unescorted bombers by day, they soon provided a fighter escort, and finished by only venturing over the island by night. As a matter of interest the Hurricane I's were only equipped with six Browning guns in order to conserve ammunition and reduce the take-off runs required on the bomb-scarred airfields of Malta. They were also often kept serviceable by using aircrews and parts off various other types of damaged aircraft.

It was of course essential that Malta, strategically situated as it was in the middle of the enemy's main supply route to Africa, should continue to be held. Yet to operate a reconnaissance and striking force from the exposed airfields of the island without stronger fighter defence would have been to court disaster. Despite the defection of the Vichy French naval forces during July 1940, which had caused the balance of sea power in the Mediterranean to swing heavily against the Allies, it was considered a worthwhile risk to send an aircraft carrier to the assistance of the island and on 2nd August H.M.S. *Argus* steamed to within two hundred miles of Malta to fly off twelve Hurricane I's. All arrived safely, as did their groundcrews and

stores which were carried to Malta in submarines. The importance attached to this relief by the home authorities can be imagined for it should be remembered that the Battle of Britain had already started in earnest.

While this consignment of Hurricanes arrived without hitch, the next met with disaster. On 17th November, again embarked in H.M.S. *Argus*, twelve Hurricanes were shipped out. This time movements by the Italian fleet forced the carrier to put about at the Hurricanes' extreme range and although all aircraft—accompanied by two Skuas—took off, only four Hurricanes and one Skua reached Luqa. The pilots of the remainder, inexperienced in long range flying, had run out of fuel.



*One of the first Hurricanes to arrive on Malta from H.M.S. Argus in 1940, P3731 of No. 261 (Fighter) Squadron.*

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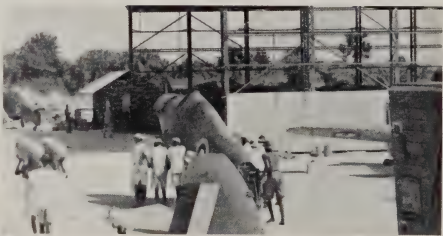
Meanwhile the urgency to strengthen the Middle East air forces and the difficulty in passing convoys through the Mediterranean had prompted the Air Ministry to find an alternative to the time-consuming route round the Cape and up the east coast of Africa. While bomber aircraft could fly direct from Gibraltar to Egypt, the fighters would have to make the journey under their own power in relatively easy stages. For this purpose the port of Takoradi on the Gold Coast in West Africa was chosen as the sea terminus. There the short range aircraft would be disembarked, uncrated and assembled for their long flight across Africa to Egypt.

Takoradi was established in its all-important role on 24th August 1940 under Gp. Capt. H. K. Thorold, and staging posts were set up at Accra (Gold Coast), Lagos, Kano and Maiduguri (Nigeria), Fort Lami and Ati (French Equatorial Africa), El Geneina, El Fasher, El Obeid, Khartoum and Wadi Halfa (Sudan), and Luxor (Egypt). The journey of 4,000 miles was one of variety and hazard for, with stage lengths of up to 600 miles over desert, mountains, marshland and jungle, any slight mistake in airmanship or maintenance would spell disaster and almost certainly the loss of pilot and aircraft. It was proposed that single-seat fighters should travel in groups of about six, accompanied by at least one twin-engine multi-seat aircraft to provide accurate navigation.

On 5th September the first batch of aircraft—six Hurricanes (Gloster-built Mark I's *without* tropical filters) and six Blenheim IV's—arrived at Takoradi. By the 19th all the Hurricanes and one Blenheim had been assembled and set off for Abu Sueir. Seven days later all but one Hurricane had arrived and the fighters were forthwith allotted to No. 274 (Fighter) Squadron. This squadron had already taken delivery of five Hurricanes\*, these having been shipped out in crates through the Mediterranean. The new arrivals from Takoradi, however, were found to be almost worn out already after their tortuous journey without air filters and, so badly had their performance suffered as a result, that they were returned to Abu Sueir to await new engines. The day following the first Hurricanes' arrival at Takoradi, H.M.S. *Argus* docked there from Gibraltar with a further consignment of twelve Hurricane I's. Equipped with air filters this time, these aircraft successfully made their way across Africa and by 11th November No. 274 Squadron

had received its established strength of twenty-four Hurricanes.

Two other squadrons were also now receiving Hurricanes in the Middle East. No. 73 (Fighter) Squadron—already famous for its Hurricanes' exploits in France and the Battle of Britain—was ordered out from home on 6th November, the ground personnel being carried through the Mediterranean in a cruiser (in which they were witnesses of an engagement with the Italian fleet off Cape Spartivento) and the pilots and thirty-four Hurricanes being shipped to Takoradi aboard



*Hurricanes being unpacked and assembled at Takoradi on the Gold Coast.*

\* P2638, P2639, P2641, P2643 and P2651

the carrier *Furious*. These were however still early days of the trans-Africa supply route and casualties among pilots and machines were relatively high. One of 73 Squadron's Hurricanes crashed into the sea while taking off the carrier, and on 1st December the Blenheim leading the first six Hurricanes suffered radio failure on the Geneina-El Fasher stage and lost its bearings. All seven machines force landed in the desert, one pilot being killed, two Hurricanes destroyed and four damaged.

The other squadron to receive Hurricanes was No. 208 (Army Co-operation) Squadron. This had been in the Middle East since the outbreak of war in 1939 and was equipped principally with Lysander I's. By December 1940, however, one of the original five Takoradi Hurricanes (V7295) had been re-engined and fitted with a forward-facing camera, and was allocated to No. 208 Squadron. Known as a Tac R Mark I, this aircraft was the first of over two hundred such machines to be modified in the Middle East and used by various tactical reconnaissance squadrons.

Events in the Middle East had been moving swiftly in the closing months of 1940. Malta had been saved from starvation and defeat, while Italy had attacked Greece through Albania. On 8th December General O'Connor launched his attack against the Italians in western Egypt. All the Hurricanes flew in constant support, No. 208 operating its sole Hurricane both in the photographic and the "contact patrol" function, first with good effect at Sidi Barrani and later with even better at Halfaya ("Hell-fire") Pass. Both 73 and 274 Squadrons flew offensive patrols from Sidi Haneish, the latter unit being in constant action throughout the month destroying many Italian Savoia Marchetti SM79's, Fiat CR42's and Cant CA310's. Ranging between Bug-Bug and Sofafi, No. 274 either maintained air cover over our advancing troops or carried out sweeps, attacking the retreating enemy trying desperately to disengage at Bardia.

This pressure continued into the New Year, all the Hurricanes having been fully tropicalised by January 1941. On the 3rd Sgt. Marshal of No. 73 Squadron alone destroyed three SM79's and, two days later, another. By the end of the first week in 1941 no Italian forces remained in Egypt and Commonwealth forces were rushing on towards El Adem and Tobruk. So complete was British air superiority that in the capture of the latter important port, only one combat in two days' operations was recorded, while all our squadrons threw every available aircraft into the battle.

But although Wavell's desert army swept on through Cyrenaica, capturing Benghazi on 7th February and reaching El Agheila the following day, the victory could only be shortlived, for increased pressure in Greece brought fresh demands which were to cripple the land and air forces in North Africa. Hastily taking advantage of the relatively short distance between his advanced landing grounds and Malta, Longmore sent six Hurricanes to reinforce that island's defences in its fight against the combined attacks by the *Regia Aeronautica* and the *Luftwaffe* (the latter now based in strength in Sicily).

### Greece and Crete, 1940-41

There is no doubt that the German intervention in the Greco-Italian campaign not only spelt disaster for Greece, and afterwards Crete, but also effectively destroyed any hope of any early defeat of the Axis forces in North Africa. Who can say how the course of the War might have been changed had the Allies assumed control of the Mediterranean by mid-1941?

Whereas Italy had attacked Greece through Albania on 28th October 1940, it had been felt at first that to send British aircraft to assist the Greeks would only draw German reaction against their country. These sentiments were, however, soon put aside and a number of Blenheim and Gladiator squadrons were ordered to Greece before the end of the year. While the Greek army carried the fight back into Albania the R.A.F. aircrews enjoyed considerable success against the demoralised Italians.

It nevertheless became evident that Germany was unlikely to stand idle while her faint-hearted ally suffered in the Balkans, and it was decided that should Hitler attack Yugoslavia or Bulgaria the Greek position would be hopeless unless given more assistance from the Middle East Command. When Germany did attack Bulgaria on 1st March 1941 these measures were put in hand and such was the depletion of our forces (both air and ground) that when the Axis in Libya counter-attacked, defeat followed defeat for the Allies throughout the next six months.

By the end of January 1941 Longmore had ordered three Gladiator squadrons (Nos. 33, 80 and 112) across to Greece, though it was realised that they would be of little use if faced by aircraft of the *Luftwaffe*. It was therefore planned to re-equip these squadrons as quickly as possible with Hurricanes. The first such machines arrived in Greece on 7th February and were forthwith allotted to "B" Flight of No. 80 (Fighter) Squad-

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ron, stationed at Eleusis under the command of Flt. Lt. M. St. J. Pattle. This dynamic South African had already destroyed about a dozen enemy aircraft in the Middle East and had been awarded the D.F.C. for his achievements in the Greek campaign.

Within three days the new Hurricanes were in action. Escorting a formation of thirty Blenheims on a raid, they were attacked by a number of Fiat G.50's which made off after losing four to the Hurricanes, Pattle himself shooting down their leader.

Aware that Germany was likely to enter the campaign, Greece decided on a concerted effort to push the Italians out of Albania, thereby strengthening her own position. It was in support of this move on Tepelini that the climax in the air battle was reached on 28th February. Sixteen Hurricanes and twelve Gladiators of Nos. 33, 80 and 112 Squadrons intercepted a formation of Fiat CR42's and G.50's and in the course of a running fight lasting ninety minutes destroyed no fewer than twenty-seven of the fifty-odd enemy aircraft. One pilot of No. 112 Squadron had to force land in a village but returned later to his unit to learn that its share in the day's fighting was five CR42's and five G.50's. "Pat" Pattle had shot down five enemy fighters—he had had to return to Paramythia to re-arm and re-fuel after his first two victories, but returned to destroy an entire section of three CR42's singlehanded near Valona. (It should be remarked that this great air battle was fought in full view of the ground forces and each of the twenty-seven Italian machines claimed was confirmed during the course of the day.)

By the beginning of April Yugoslavia had ranged herself alongside Greece in the face of something like forty-five German, Italian, Bulgarian and Hungarian divisions, and the 1,200 aircraft of *Luftflotte 4*. The allies could by now muster fewer than two hundred operational aircraft, of which only about 80 were of modern design. The part played by the Yugoslav Hurricanes has already been described in Chapter 4, but such was the weight and rapidity of the German attack that they were unable to influence materially the events that were now to take place in Greece.

On 6th April Germany struck at Yugoslavia from five sides and the threat thus caused to British forces in Central Greece together with the subsequent enemy advance on Salonika forced withdrawal into Central Macedonia. The poor weather kept grounded much of the *Luftwaffe* during the

period 10–12th April but on the 13th the skies cleared and the full fury of *Luftflotte 4* now fell upon the retiring British and Greek forces.

By now almost all the Gladiators of the R.A.F. in Greece had been replaced by Hurricane I's and with these, on 14th April, No. 33 Squadron rose in defence of the Anzac Corps—being heavily bombed by Junkers Ju 87's. Swift retribution followed the next day when twenty Bf 109's paid a lightning visit to Larissa just as three Hurricanes of No. 33 Squadron were taking off on a patrol. Though one of the Hurricanes managed to maintain a running fight—destroying one of the attackers—the other two machines were shot down.

Under the pressure of overwhelming forces of forward-based enemy aircraft, it was decided to withdraw all the Hurricane squadrons to the area of Athens for use in defence of a possible evacuation from Greece, and Nos. 33, 80 and 112 Squadrons moved back on 17th April. No. 208 (Army Co-operation) Squadron, of which a detachment with Hurricanes and Lysanders had been sent to Greece, delayed its withdrawal from Paramythia for forty-eight hours; in so doing it narrowly missed annihilation for, shortly after its aircraft had taken off, a heavy German raid developed over the airfield in which almost every remaining aircraft was destroyed, including an entire Greek Gladiator squadron.

By 19th April the remnants of the four Hurricane squadrons possessed no more than twenty-two serviceable machines, these being dispersed on the airfields at Menidi, Eleusis and Argos. Three enemy raids, each by over fifty aircraft, were intercepted that day, the Hurricanes destroying eight but ill-affording serious damage to three of their own number. The following day a number of Bf 110's penetrated to Menidi while the Hurricanes were patrolling elsewhere, with the result that heavy damage was inflicted among Blenheims dispersed round the airfield.

That same afternoon one of the largest enemy air attacks of the campaign was launched by about a hundred Junkers Ju 88's, Messerschmitt Bf 109's and Bf 110's against the Piraeus. All the remaining Hurricanes of Nos. 33, 80 and 208 Squadron—fifteen in all—scrambled to intercept. Led by Sqdn. Ldr. Pattle (now promoted to command No. 33 Squadron) twelve of the Hurricanes climbed up to engage the enemy fighters while the remaining three tackled the dive bombers. About fourteen of the enemy were estimated to have been shot down for the loss of five Hurricanes, but among these was "Pat" Pattle. Having already been seen to destroy two Bf 110's and a Bf 109,



*The late Squadron Leader M. T. St. J. Pattle, D.F.C.,  
O.C. No. 33 (Fighter) Squadron.*

Pattle turned to assist another Hurricane which was being attacked by a Bf 110, but before he could open fire two more enemy fighters closed from behind and shot him down into the sea off Megara.

So died one of the highest-scoring Hurricane pilots of the War, a man whose name never achieved the fame of his fellow-countryman "Sailor" Malan or of the other top British "aces"; yet, while his exact score is not known, records indicate that in the short space of four months he destroyed no fewer than twenty-four German aircraft while flying Hurricanes in Greece; furthermore, over half a dozen Italian aircraft had fallen to his Gladiator's guns in the Western Desert previously. It is almost certain that he was about third highest-scoring British pilot after Johnson and Malan.

The days of the British forces in Greece were numbered. On 22nd and 23rd April all British aircraft—except the Hurricanes—were ordered to retire to Crete or Egypt. The four Hurricane squadrons were now concentrated at or around Argos and were joined by a few replacement machines from Crete.

Tragedy struck almost immediately. No sooner had the twenty-odd Hurricanes arrived at Argos when a large formation of Bf 110's arrived over the airfield; four of the replacement fighters managed to take off to intercept, but while they were occupied with one section of the enemy formation others simply emptied their magazines into the dispersed aircraft on the ground. By the

time the enemy withdrew only seven Hurricanes remained airworthy. Two days later these were ordered over to Crete whence they were to cover the return of our evacuation ships.

If events in Greece had amounted to tragedy, those that were to follow in Crete amounted to sheer disaster. The very speed with which the Greek campaign had ended gave little time in which a suitable defence plan for Crete could be drawn up to suit the circumstances. Army, Navy and Air Force had all suffered heavily and such was the disorganisation—characteristic of evacuations under heavy pressure—that there was little that any one of the forces could do to support the others.

While nearly 30,000 exhausted and ill-equipped Allied troops strove to prepare for the inevitable invasion, much of the Mediterranean Fleet was engaged in protection of a vital convoy making for Alexandria. In the air, or rather on the island's three landing grounds at Maleme, Retimo and Heraklion, the defence rested on but fourteen fighters—three Fleet Air Arm Fulmars, four Gladiators and the seven surviving Hurricanes from Greece. Yet lest it be thought that the defence of Crete was regarded as hopeless, it should be remarked that the Allies possessed full and accurate knowledge of the impending invasion and embarked from Egypt about 27,000 tons of equipment for the island; however, such was the weight of enemy air activity in the Eastern Mediterranean that only about one tenth of this essential material reached its destination.

Against the puny fighter defence was ranged the combined might of *Fliegerkorps VIII* and *XI*—consisting of 700 transport machines, 430 bombers, 180 fighters and 80 gliders—and though the airfield facilities on the island could have accommodated up to five Hurricane squadrons, there simply were not Hurricanes enough in the Middle East to equip five squadrons. Nor, for that matter, could any more be spared for, as will be told anon, events in Syria and Iraq were making demands on the limited resources of the Middle East Air Command.

During the first half of May attacks were carried out by the fighters and bombers of *Fliegerkorps VIII* against Crete as a preliminary to the coming invasion, it being this effort that forestalled our hopes to re-equip the island garrison. Time after time the tiny band of Hurricanes, Gladiators and Fulmars managed to intercept the raids, but their endeavours obviously could not be maintained for long. The Fulmars and one of the Gladiators were caught and destroyed on the ground at Maleme,

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and two of the Hurricanes were shot down near Suda Bay. No. 208 Squadron, having arrived in Crete without any Hurricanes, was withdrawn from the island leaving about a dozen pilots of Nos. 33, 80 and 112 Squadrons to fly the remaining Hurricanes. By the middle of May these had been joined by seven further machines which had just arrived up from Takoradi, and with these twelve Hurricanes and three Gladiators the R.A.F. awaited the invasion.

Sqdn. Ldr. E. Howell, who had been appointed to command No. 33 Squadron after the death of Pattle, arrived in Crete from a Spitfire squadron and without any previous experience in Hurricanes, yet having been hurriedly shown the rudiments of the strange cockpit he found himself in desperate action on his first flight. No sooner had he taken off from Maleme on 14th May than he was surrounded by hordes of enemy fighters, of which he destroyed one and damaged another.

But in the next four days the number of Hurricanes dwindled and although an occasional replacement could be spared from Alexandria only four Hurricanes and three Gladiators remained serviceable on the 19th. It was therefore decided to save these and their pilots from annihilation and they were ordered back to Egypt.

The following day, with our fighter defence now eliminated, *Fliegerkorps XI* launched its airborne attack against the island. Three main airborne landings were made, each in the vicinity of the main landing grounds on the north coast. Only that at Maleme was successful but the Germans were quick to exploit this gain, and it was here that the defence of Crete was lost. At and around this landing ground at the western end of the island the Germans landed almost thirty thousand troops, by air and sea, within the following week.

Support for our troops was provided to a limited extent by bombers flying from bases in Egypt some 450 miles distant, but this range was too great for British fighters during the first vital week of the invasion. The *Luftwaffe*, on the other hand, possessed the all-important tactical advantage in that its single-engine fighters could operate within easy range of the island thus giving the enemy air superiority for the invasion.

Several attempts were made to dispute this superiority but each met with frustration. It was proposed to operate fighters from the island again and a party of airmen was sent from Suda Bay to establish a landing strip on the south coast. The party was however captured before its mission could be completed. Heraklion, which was now covered with the debris from the forestalled

German airborne assault, was chosen as another fighter strip and landing space was prepared to receive twelve Hurricanes—now sent from Egypt. Two of the Hurricanes were shot down by our own naval forces whose guns also prevented four others from landing. Only four arrived at Heraklion but all were destroyed, either during their landing on the atrocious runway or during a bombing attack before they could be refuelled.

The remaining six Hurricanes were now equipped with long range fuel tanks (the first fixed 44-gallon tanks to arrive in the Middle East) and it was found possible to operate these over Crete, flying from Egyptian bases. Despite their endurance permitting only a few minutes for patrol over the island their presence was not only heartening for our own hard-pressed troops but also some slight deterrent to the enemy.

By the end of May the defence of Crete was at an end and about half the island's defenders were successfully evacuated. During the last week of the preliminary air operations, together with the ten days of invasion, the three Hurricane squadrons destroyed about 125 enemy aircraft for the loss of twenty-eight of their own and sixteen pilots. A further ninety-five German and Italian aircraft were shot down by our surface forces and the small number of Gladiators and Fulmars.

The moral of Crete was fundamental and stark. Prolonged defence had been impossible in the face of enemy air superiority and the defenders suffered heavily under the weight of the *Luftwaffe's* attacks. Under the circumstances it is, however, hard to see what more the air defences could have done, for the pilots of the Hurricanes had fought themselves almost down to their last machines and our commitments elsewhere stretched our resources to the extreme.

### Iraq and Syria, 1941

Passing references above to other Middle Eastern commitments not only concern the struggle against the Axis forces in North Africa, for British military interests and responsibilities ranged far and wide. Since the early nineteen-twenties the Royal Air Force had been responsible for the internal security of Iraq and, resulting from the Anglo-Iraqi Treaty of 1934, a large R.A.F. base at Habbaniyah had been built.

Now, in April 1941, Habbaniyah represented an important though geographically isolated unit in the Middle East. Accommodating no more than a training school (No. 4 F.T.S.) and about seventy antique second line aircraft, the base was also extremely vulnerable. When, on 30th April, follow-



*Early Hurricane I's (T9530, W9320, W9349 and Z4095) flying over Egypt at the end of 1940. Note the absence of tropical filters.*

ing seizure of power in Iraq by Rashid Ali—an ardent and paid Axis sympathiser—the Iraqi army suddenly appeared in the desert around the British garrison, the best aircraft that could be brought into action were no more than ancient Audaxes and Oxford trainers, hurriedly adapted to carry bombs.

For six days the Iraqis invested Habbaniyah and, supported by their own air force, carried out a continuous though relatively ineffective bombardment of the aerodrome and station facilities during daylight hours. In addition to the attacks by the training aircraft, the R.A.F. commenced evacuation of families and non-essential personnel, while a small number of Wellington bombers from Egypt was sent over to join in the defence. By 5th May the Iraqi army had become dispirited and that night it decamped and moved off in the direction of Baghdad.

Though Habbaniyah was now re-opened and out of immediate danger, the appearance of modern German aircraft in northern Iraq suggested that unless checked forthwith a dangerous situation might develop at any moment. All remained quiet at Habbaniyah for a few days, the principal activity being limited to reconnaissance sorties over the main roads into Baghdad but when, on 16th May, three Heinkel He 111's carried out a raid on the R.A.F. Station (incidentally causing more damage than was suffered throughout the Iraqi siege) it was decided to send No. 94 (Fighter) Squadron from Egypt.

Arriving at Habbaniyah on the 17th with nine Gladiators and four Hurricanes, No. 94 went into

action immediately; two of the Hurricanes (late series tropicalised Mark I's) carried out strafing attacks against Iraqi motor transport on the Baghdad–Falluja road. When it became evident that the bases from which the German aircraft were operating were beyond the range of the Hurricanes already sent, two further machines—this time equipped with fixed 44-gallon long range tanks—were sent out to No. 94 Squadron from Aboukir.

Flown by Flt. Lt. Sir R. A. MacRobert and Fg. Off. J. G. Sandison, these new machines ranged over Mosul and Erbil on 21st May destroying a number of Heinkel He 111's and Messerschmitt Bf 110's, before MacRobert's aircraft was shot down and the pilot killed. (He was the eldest of three brothers, all of whom were killed flying in the early stages of the War, and his mother, Lady MacRobert, donated three Hurricane IIC's in their memory to the Middle East Air Command, each machine bearing the family crest and the name of one of her sons.)

Four further Hurricanes reached Habbaniyah on the 21st and these maintained standing patrols over the Baghdad area, occasionally sighting Bf 110's and preventing them from interfering with our troops and installations. A tactical reconnaissance Hurricane was allotted to No. 94 Squadron on the 24th and the following day reconnaissance sorties over Ramadi, Baghdad, Samarra, Amara, Mosul and Balad indicated that the rebellion was over and that the situation had been restored to something approaching normality. Supported by aircraft from Habbaniyah,

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*A tropical Hurricane I, V7826, equipped with 44-gallon auxiliary fuel tanks. Such aircraft reached the Middle East in May 1941.*

a Commonwealth column set out for Baghdad and on 1st June the Regent returned to his capital.

While the Hurricane's part in putting down the Iraqi revolt came about late in the proceedings, Hurricane squadrons supported the advance into Syria almost from the outset. As early as 14th May it had come to the notice of the Allies that German aircraft, *en route* for Iraq, were staging at Damascus, Rayaq and Palmyra in Syria; moreover, were the Germans intent on exploiting that country's affiliation to the Vichy regime, the Allied position in the Middle East—and, in particular, defence of the Suez Canal—would shortly become extremely difficult.

By 25th May an Allied force was therefore made ready to eliminate Syria as a potential enemy stepping stone, and comprised the equivalent of about two and a half divisions and a cruiser squadron. It was supported in the air by two Fleet Air Arm squadrons of Fulmars, a squadron and a flight of Hurricanes, two squadrons of Blenheims, one of Tomahawks and a flight of Gladiators.

The Hurricanes were newly-issued tropical machines of No. 80 (Fighter) Squadron which had so recently been withdrawn from Crete, and a flight of six fighter reconnaissance aircraft of No. 208 (Army Co-operation) Squadron. So short of pilots was No. 80 Squadron after its campaigns in Greece and Crete that on several occasions some of its aircraft were loaned to No. 208 (flying from Gaza in Sinai, No. 208 Squadron with three of No. 80 Squadron's Hurricanes joined in the strafing raids on Damascus). Before the month was out long range Hurricane I's were issued to one flight of No. 208 and these started operations from Aqir while the short range machines moved up the coast to Haifa on 1st June.

The advance into Syria by the ground forces began on 8th June, simultaneous thrusts being made from Iraq, Trans-Jordan and Palestine. The Vichy air force could muster about one hundred aircraft of quite modern vintage against about sixty British aircraft. Early in the campaign the Fulmars found themselves in action against French Dewoitine and Morane fighters and lost many of their number with the result that some of the Hurricanes were called upon to protect the cruisers from possible attacks by Vichy bombers. The remainder however were flown in constant operations against the Vichy airfields and together with the Blenheims and Tomahawks contrived to prevent the enemy bombers (mostly ex-French Marylands) from interfering with our troops. By the end of June however, after Damascus had fallen to Indian forces, the enemy fought back fiercely and our advance slowed down. At this point events elsewhere in the Middle East permitted further forces to be sent to Syria and the Lebanon, amongst them the Hurricanes of No. 260 (Fighter) Squadron, and these aircraft forthwith joined in the attacks on the remaining Vichy airfields.

In the first week of July the forces advancing from Iraq captured Palmyra and thrust on towards Homs. By the 10th the Vichy situation had become hopeless for reinforcements had been unable to penetrate the blockade of our cruisers while complete air supremacy had been achieved by our pilots who now rained bombs and bullets into the area around Beirut.

After the inevitable armistice, which was concluded on 14th July, the Vichy air force commander stated that he owed his defeat principally to the operations by our fighters over his airfields, for of his force of about 100 aircraft fifty-five had been destroyed or severely damaged on the ground. The Frenchman went on to remark that having lost a further thirty machines in the air, it had been decided to withdraw the remainder back to Aleppo—from which base it was practically impossible to cover the ground forces round Beirut. The fact that the long range Hurricanes of No. 260 Squadron were capable of reaching Aleppo contributed largely to the decision to surrender.

### The End of the First Phase

The occupation of Cyrenaica by Wavell's army had been shortlived, for the need to strengthen our forces in Greece at the expense of those in North Africa also coincided with the arrival of the first relatively strong German units—under Erwin



*Battle-scarred Hurricanes are transported eastwards for repair at one of the Maintenance Units in the Suez Canal Zone.*

Rommel—in Libya. In March 1941 the British forces commenced a retirement that took them back almost to the point from which they had set out three months earlier.

Hurricanes, being the most modern fighters available, had been switched away from the North African desert to every battle area in the Middle East. However, with the growing stream of reinforcements arriving up the Takoradi route together with a consignment of fifty Hurricanes which had miraculously survived a sea trip

through the Mediterranean unscathed to dock at Alexandria on 12th May, the number of Hurricane squadrons grew rapidly and by the end of June the figure stood at eight.

Moreover the supply of Mark I aircraft had by now stopped and the more powerful Mark II had started to appear, a fact much appreciated by our pilots who were now finding that the Messerschmitt Bf 109E's were less severely handicapped by tropical equipment as were their own aged Hurricane I's.



*Night fighter Hurricane I's of No. 213 (Fighter) Squadron responsible for the night defence of the Suez Canal during 1941. Aircraft not equipped with tropical filters tended to be relegated to night flying duties.*



*During the Second World War the Experimental Design Department of Hawker Aircraft Ltd. was dispersed to "Claremont", a large mansion near Esher, Surrey.*

## *Chapter 8*

# DEVELOPMENT OF THE HURRICANE MARK II

The end of the first campaigns in the Middle East marked the end of the Hurricane I's career against the *Luftwaffe*, though it will be seen later that a small number of these aircraft found their way out to the Far East in an attempt to stem the Japanese flood in Malaya at the end of 1941.

The Hurricane Mark I had remained fundamentally unaltered since the introduction of the variable-pitch propellers during the winter of 1939-40. The aircraft had fought in France, Norway, Finland, the Battle of Britain, the Balkans and the Middle East; their eight-gun armament had proved devastating up to the time when Germany decided to provide greater armour protection for her aircraft.

It was, in fact the quest for heavier armament in the Hurricane that led to the Mark II version, and with it came the more powerful two-stage supercharged engine, the Merlin XX.

Proposals for an increase in armament over the original eight-gun requirements of 1934 date back to Hawker's tender, early in 1936, to Specification F.37/35. This had called for a single-seat fighter to

be armed with four 20-mm. cannon, and Hawkers had put forward a scheme to equip the Hurricane with this armament. At the time of the tender, of course, only the fabric-winged prototype existed and, with a two-blade wooden airscrew, the performance—without guns—was 315 miles per hour at 16,200 feet. It was however estimated that to load the aircraft with four of the larger guns would reduce the speed to about 270 miles per hour, a performance not considered suitable for a modern interceptor fighter. The Hurricane proposal was therefore shelved and it transpired that the Westland Whirlwind (with two Rolls-Royce Peregrine engines) was developed to meet the requirement.

Preoccupation with production of the standard eight-gun Hurricane I during 1937 and 1938 allowed Hawkers little time to investigate increased armament, nor were such investigations likely, at that time, to meet with much support. The singleness of purpose dictated by the portents of the Munich crisis left no room for interest in projects which might sidetrack efforts to build fighters as fast as possible.

Nevertheless plans were well under way for the manufacture of the Swiss Oerlikon and Hispano 20-mm. cannon under licence in the United Kingdom by the end of 1938 and already several fighter designs had been evolved using these guns. It was in connection with the air firing test programme of the new guns that, in December 1938, Hawkers were asked to prepare a Hurricane to accommodate an Oerlikon gun under each wing. The aircraft chosen was the armament trial installation machine, *L1750*, which had been equipped with increased armour and a stiffened gunsight. First flight with the two Oerlikons was undertaken by Lucas at Brooklands on 24th May 1939. The all-up weight was 6,166 pounds (the Browning guns having been removed) and, with a Merlin II driving a Watts propeller, the top speed was 302 miles per hour at 14,800 feet. In this form the machine was delivered to the Aircraft and Armament Experimental Establishment at Martlesham Heath. It should be pointed out, however, that this installation was purely experimental and at the time was regarded as no more than a means of air testing the new guns.

Before passing on to the proposals, made early in 1940, for increased armament in the Service Hurricane, we should look briefly at developments in other directions, especially with regard to the powerplant, that were to take place at Hawkers during the first year of the War.

It was recognised from the outset that with the heavy reliance upon production of the Merlin engine—in addition to the Hurricane and Spitfire, the Battle, Defiant and Henley were so powered—any damage caused to the Rolls-Royce factories by the enemy would seriously weaken our air force, and most manufacturers set in train design studies to investigate alternative powerplants for their aircraft, should the need for such arise.

The Hawker design staff—itself moved to the comparative safety of a large mansion just outside Esher early in the War—commenced a series of alternative powerplant studies for the Hurricane. Schemes were prepared using the Napier Dagger III 24-cylinder air-cooled engine and the Bristol Hercules 14-cylinder air-cooled radial engine, though neither proceeded beyond the drawing stage. Later in 1940 the Rolls-Royce Griffon was also studied as a possible installation as were newer versions of the Hercules, but these were more substantial projects aimed at increasing the Hurricane's performance.

Rolls-Royce, in addition to its commitments to develop the new Vulture, Peregrine and Griffon engines, was principally engaged in the manu-



*Two of the Gloster test pilots who performed much of the Hurricane flying at Brookworth in 1940-41, P. E. G. ("Gerry") Sayer, right, and M. Summers.*

facture of Merlins and was working to achieve a version of greater power output than that of the Merlin III, and which was suitable for massive production. Altogether four basic engines were in turn proposed. The first, fitted in *L1856* was the Rolls-Royce R.M.3S and was flown by Reynell on 6th July 1939 before being delivered to Derby. This was later to become the Merlin VIII and, using 100-octane petrol, was pure-water cooled. Next tried was the Merlin XII, in *L2026*, which was first flown by Seth-Smith on 13th July 1939, and much work was carried out on this installation, including the evaluation of interconnected throttle-and-pitch controls. The third engine was the Rolls-Royce R.M.4S and, fitted in the Company Hurricane, *G-AFKX*, and flown by Reynell on 9th June 1940 at Brooklands, became the flight prototype of the Merlin 45.

Two days later, on the 11th, Hurricane I, *P3269*, was wheeled out at Langley with a Merlin XX and a Rotol R.X.5/2 constant-speed three-blade propeller. Use of this two-stage supercharged engine, developing 1,185 b.h.p. in its early form, had been proposed by Hawkers in February 1940 and, flown by Lucas at an all-up weight (with eight Browning guns) of 6,689 pounds, *P3269* possessed a top speed of 348 miles per hour—thus the fastest armed Hurricane ever flown. However subsequent

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*Left, AG122, a Canadian Hurricane X used by Rolls-Royce Ltd. for engine development. Right, Z2515 a Mark II Series 1 at Boscombe Down for engine-aircrew compatibility trials.*

modifications found necessary to the radiator bath, together with such minor alterations as an enlarged rear view mirror, brought about reductions in the performance to the point when, at the agreed production standard of preparation, the maximum speed of the prototype (now officially designated the Hurricane II) had dropped to 342 miles per hour.

Yet as far as the Hurricane was concerned the Merlin XX was superior to the other suggested alternatives for it proved to demand least redesign of the airframe structure and—of prime importance in mid-1940—it could be introduced into the production lines without major disruption. Thus from the first week in September 1940 all new Hurricanes delivered from Langley to the Royal Air Force were Merlin XX-powered. (Existing Works Orders at Brooklands and Glosters “ran-out” on Hurricane I’s for a further two months before changing to the Hurricane II entirely.)

Returning now to the question of providing the Hurricane with increased armament, Camm had submitted to the Air Ministry in January 1940 a scheme to fit four additional Browning guns in the newly-introduced metal wings. The proposal was logical for twelve-Browning armament had been specified for the Typhoon and Tornado fighters, work on which was occupying the attention of the Hawker experimental design staff. Nevertheless the heavy loss of Hurricanes in France in May that year and the subsequent demand to increase production caused the Air Ministry to “soft-pedal” the twelve-gun wing for the time being, it being their intention to introduce the modification with the Merlin XX-powered Hurricane II.

The threat of a shortage of Browning guns (which never, in fact, materialised) during the Battle of Britain yet again delayed the introduction of the twelve-gun wing and it was decided that the first one hundred and twenty Mark II’s would be eight-gun fighters using, as far as possible, Mark I

wing and fuselage tools and jigs. It was these aircraft, termed Hurricane Mark IIA Series 1, that commenced delivery to R.A.F. Fighter Command from 4th September 1940. At an all-up weight of 6,968 pounds, their top speed at 15,200 feet was 342 miles per hour.

One of the lessons learned as a result of Britain’s participation in the Norwegian campaign earlier in 1940 was that the Royal Air Force, to be an effective striking force overseas, desperately required long range fighters. Hawkers had, at that time, been pursuing studies into providing the Hurricane with under-wing auxiliary fuel tanks and these were immediately adopted and awarded the highest priority. These at first took the shape of fixed 44-gallon ferry tanks and, fitted to Hurricane I, P3462, flew on 7th May 1940. These tanks were later stressed to withstand combat manoeuvres, and finally made jettisonable. It has already been demonstrated that these “long range” Hurricanes were of inestimable value on their arrival in the Middle East early in 1941.

While the introduction of the long range fuel tanks in no way precipitated the development of the Hurricane II, it was obvious that provision for their carriage would, as a matter of course, be included in subsequent versions. It was therefore important that the Hurricane II should be capable of accommodating eight- or twelve-gun wings and that these should have attachments for external stores. The Hurricane Mark IIA Series 2 was thus introduced and included universal attachment points and junctions for fuel and armament services. It was introduced into both Brooklands and Langley production lines towards the end of October 1940, and into the Brockworth line the following month. A further modification was also introduced at this time, though not all the early Series 2 aircraft were so built; it was the provision of an extra fuselage bay and frame immediately forward of the cockpit front frame, a modification



*The 8-gun Hurricane IIA Series 2 with lengthened nose. Right: Z3451, a Hurricane IIA at Boscombe Down with Small Bomb Carriers (SBC) under the wings. Below right: the Langley Defence Hurricane IIA Series 2.*

which increased the Hurricane's overall length by by some seven inches.

Many versions of the Hurricane IIA came to be developed and it remained in production—interspersed with other Mark II's on the production lines—until late in 1942. Deliveries to Fighter Command continued until the end of March 1941 and thereafter remained at Maintenance Units for issue as replacement aircraft. Tropical versions started leaving British ports during the first week in May 1941, reaching squadrons in the Middle East towards the end of the following month.

Meanwhile the twelve-gun wing had been introduced into the lines at Langley at the end of November 1940, the aircraft being designated the Hurricane IIB. From the outset this version possessed wing attachment points for 44-gallon external tanks and following design studies to equip a Mark I with a pair of 250-pound bombs (P2989, flown at Boscombe Down on 18th April 1941) the Ministry of Aircraft Production adopted Hawker's suggestion to make this provision in the Mark IIB. The first such machine to be tested at Boscombe Down, in May 1941, was Z2326. As experience was gained on the installation it was found that to allow sufficient space for the bomb rack attachment in the wing and accessibility to the associated wiring, one of the inboard group of guns was omitted in each wing. Not all "Hurri-bomber" squadrons observed this modification,



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*The Hurricane IIB. Above: a 12-gun fighter. Right: a ten-gun fighter-bomber with two 250-lb. bombs. Centre right: the tail-armed 250-lb. bomb. Bottom right: a Hurricane IIB carrying two nose-armed 500-lb. bombs.*

preferring to retain all twelve guns for more effective use after having dropped the bombs! Later in 1941 Z2326 was used in the clearance programme for the carriage of two 500-pound bombs. The first tropicalised Mark IIB, Z7480—modified from a Mark IIA Series 2—was flown by Lucas on 8th February 1941.

It was in May 1941 that a further Hurricane production line completed its first machine—a Mark IIB, AP516. This was at the Longbridge factory of the Austin Motor Company. The second aircraft, AP517, was delivered for production testing at Langley, being flown by Seth-Smith on 5th May. The majority of the Austin-built aircraft (300 in all) were held at Maintenance Units for tropical conversion by the Service; however only a relatively small number were shipped to the Middle East (for instance AP851 and AP852 of No. 208 (Army Co-operation) Squadron in 1942), by far the greater proportion being supplied to Russia.

Undoubtedly the most important version of the Hurricane was that introduced next—the four-cannon Mark IIC, of which 4,711 were built in the United Kingdom, the majority at Langley.

The four-cannon proposal originated at Hawker Aircraft in about May 1940, but initially no official support was forthcoming. It was therefore decided to commence a trial installation as a feasibility exercise and permission was gained to instal four Oerlikons in a pair of damaged wings





*An early Hurricane IIC, BD787.*

using the existing Oerlikon drum ammunition feed mechanism. Work on the installation started early in June and so successful did it appear that permission was gained to fit the wings on a trials Mark I (believed to be *P2640*). First flight was carried out at an all-up weight of 7,428 pounds by Dick Reynell on 7th June 1940, and after about half a dozen flights at Brooklands the aircraft was delivered for preliminary firing trials at Boscombe Down. Though no performance measurement was carried out it seems likely that the top speed of this Mark I (with D.H. two-position airscrew) was in the region of 290 miles per hour at 12,000 feet. The air firing trials continued without hitch until on 19th August the aircraft was allocated to No. 151 (Fighter) Squadron at North Weald for

operational evaluation in the Battle of Britain. No records however survive to indicate whether the aircraft ever went into action and it is suspected that it was entrusted to a non-established pilot.

Encouraged by the success with which the installation had been achieved, Hawkers gained permission to obtain thirty pairs of wings which had been damaged in the region of the gun bays and which were awaiting repair. These were delivered to the Experimental Shops in Canbury Park Road in November and, using hand and semi-tooled methods, were made ready for the installation of Oerlikon guns. First aircraft to fly was Hurricane I *V7360* (flown by Lucas on 5th December) and was followed shortly after by *W9314* (Gloster-built) and *V7260*. These aircraft



*A late production Hurricane IIC, KZ466. Principal external differences from the earlier aircraft lie in the modified exhaust ejector manifolds and a reflector gunsight.*

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also used the old drum feed gear but differed from the original T.I. in having a reduced fuel capacity, Rotol R.X.5/5 propeller and metal ailerons; the top speed measured on all three aircraft averaged 291 miles per hour at 13,100 feet.

With the introduction of the Merlin XX Hurricanes on the Langley lines, it was decided to phase the remaining hand-tooled four-cannon wings into the newly-built aircraft, and the first four-cannon Mark II Hurricane (thus the prototype Mark IIC), V2461, was flown by Seth-Smith on 6th February 1941. This aircraft differed from the previous three four-cannon models in being fitted with the Chatellerault belt ammunition feed, for it had been shown that the wing-mounted drum feed gear was prone to icing trouble and it was intended to adopt the same belt feed system as was scheduled for the four-cannon Typhoon IB. However production delays with the Chatellerault type resulted in both belt and drum feeds being introduced to keep pace with the high production rate of Hurricanes achieved towards the end of 1941.

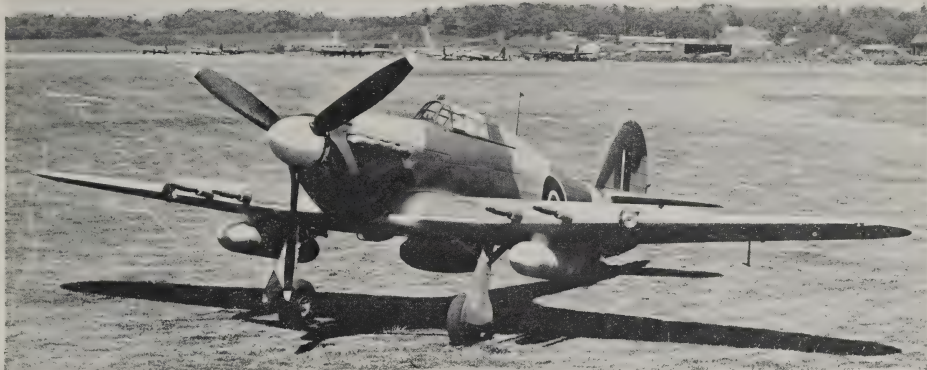
Three experimental semi-tooled Hurricane IIC's (Z2589, Z2885 and Z2891) were delivered to Boscombe Down during February 1941 and performance evaluation carried out. At an all-up weight of 8,100 pounds, the top speed was 336 miles per hour; a batch of tropical aircraft with all-up weights of about 8,260 pounds, had a mean top speed of about 320 m.p.h. (Note. With regard to maximum speeds measured on Hurricanes during 1941, there was found to be considerable

variation from aircraft to aircraft—often as much as 4 per cent on a particular version. This was roughly proportional to the degree of skilled workmanship employed in the final assembly of the aircraft. Repaired aircraft usually suffered worst, although it would be invidious to imply that any less care was taken in the repair of Hurricanes than in the manufacture. Therefore wherever performance figures are quoted, especially for the Mark II, production checks by Boscombe Down have been averaged out over a number of aircraft. Thus some of the figures quoted here may differ substantially from those quoted for various reasons at the time.)

New-build cannon wings were introduced into the lines at Langley during May 1941 and deliveries to home-based fighter squadrons started from the



Above: A Hurricane IIC fighter-bomber, HW603. This was one of three Hurricanes presented to the Nation by Mrs. Gillan in memory of her son, Wg. Cdr. John Gillan, pre-War C.O. of No. 111 (Fighter Squadron).  
Above: right. Close-up view of the 250-lb. bomb installation on a Hurricane IIC.



*Upper picture. This Hurricane IIC, at Brooklands in 1942, is equipped with jettisonable 44-gallon long-range tanks. Lower picture. Another Hurricane IIC, this time at Langley, carries two fixed 90-gallon ferry tanks. Aircraft flying on the Takoradi supply route were thus equipped.*

Maintenance Units about a month later. Hurricane IIC's fought as day and night fighters, intruders, fighter-bombers, reconnaissance fighters, ground support aircraft, air/sea rescue patrol and guard aircraft, trainers and in many other roles, both at home and overseas. They remained in constant production until late in 1944 and both the surviving Hurricane examples are Mark IIC's.

Before moving on to the next production version of the Hurricane II, reference should be made to the small number of sub-variants, "one-off" experiments and projects which appeared on the Mark II before mid-1941.

Of the criticisms that were levelled at the Hurricane, none was voiced more often than that it lacked a satisfactory rearward field of view for the pilot. As early as October 1940 a Mark I,

P3899, had been flown by Capt. Broad to assess a modified hood with a transparent "blister" incorporated in each side of the sliding canopy. Later the Mark II prototype, P3269, was flown with this hood, but also included a pair of rear-view mirrors attached to the sides of the quarterlight frame. The scheme was not however considered successful due to the optical distortion of the plastic and, although the hood was modified from time to time and flown by various pilots, the scheme was dropped. Instead, many home-based squadrons adopted a semi-official remedy, that of fitting an enlarged "Desmo" car mirror over the windscreen frame.

Issue of Hurricane IIA's and IIB's to night fighter and intruder squadrons during the winter and spring of 1940-41 brought forth a more easily

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remedied criticism. This was that at the crucial stage of a night interception, while the pilot was closing with his target at something like full throttle, the glare from the exhaust flames would as likely as not temporarily destroy his night vision at the very time that this was most needed. A small anti-glare shield was forthwith introduced into all Hurricanes destined for night-flying units—and many others besides; the shield was situated directly between the windscreen quarterlight and the rearmost exhaust manifold. Another modification tried out (and incidentally evaluated by No. 1 (Fighter) Squadron during 1941) and also aimed at improving vision, was the introduction of a direct-vision windscreen and was first flown on Z2399.

A little-known trial installation was that carried out on the prototype Hurricane II with Rotol Jablo four-blade propellers scheduled for the Typhoon/Tornado production programme. Also flown on this aircraft were various Spitfire components in an investigation into the interchangeability of spare parts between the two types. Rotol Ltd. used Hurricane II's Z2321 and Z2322 in the development programme for dive and landing brake propellers in 1941.



*The towed-Hurricane experiment. Equipped with Malcolm hydraulic towing hooks in the outer wing sections, the Hurricane was towed behind a Wellington by means of a nylon cable attached to an apex plate on a steel bridle. The picture above shows the towing bridle cut as a result of out-of-position flying. As well as being proposed for bomber protection, the system was also intended as a means of delivering fighters direct to Malta by air from the United Kingdom. The pilot responsible for the development flying was Charles Barnard.*

A Hurricane II (actual machine unknown) was delivered to the Royal Aircraft Establishment at Farnborough early in 1941 for rocket-assisted take-off trials though, unlike later work which was carried out for operation from aircraft carriers, these were directed at suiting the Hurricane for operation from short airfields at overload weight. As far as is known, however, the R.A.F. did not use R.A.T.O.G. on Hurricanes during the War.

Four Gloster-built Mark IIC's were diverted to Flight Refuelling Ltd at Staverton, Gloucestershire, for towing trials behind Wellingtons. This idea was a further outcome of Britain's painfully-acknowledged lack of long range escort fighters. It was proposed that bomber formations should tow their own escort fighters and, if faced by enemy interceptors, these would be cast off to provide defence for the bombers. Similar motives prompted a scheme to mount a Hurricane on top of a Liberator bomber, Hawkers being responsible for the fighter's adaptation and Short Bros. Ltd., designing the mounting cradle for the bomber. While several towing flights were carried out from Staverton, the composite Liberator plan was dropped. It was found that prolonged flight without engine resulted in severe icing on the fighter often preventing its engine from being started up. This trouble also eventually led to the abandoning of the towing scheme without it ever becoming operational.

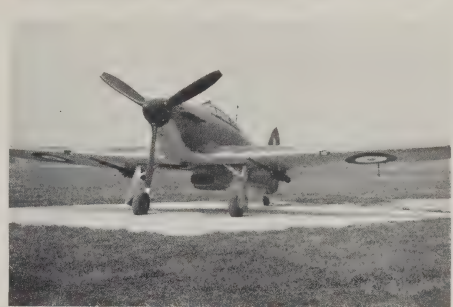
We come now to two of the most significant developments in the wartime history of the Hurricane. One was the introduction of the 40-mm. anti-tank gun and the other was adaptation of the Hurricane to carry rocket projectiles (at the time referred to under the cover designation as U.P.'s or unrotated projectiles). Known as Mark IID's, anti-tank Hurricanes were first used in the Western Desert at the Battle of Bir Hakim of 1942 and thereafter became the scourge of enemy armoured vehicles in the Middle and Far East, as will be related in later Chapters.

Fitted with rockets, Hurricanes went into action in North-West Europe, the Mediterranean theatre, the Far East and on the high seas. Besides, the early R.P. Hurricane trials—the first to be performed by a British single-seat fighter—led to and provided much essential data for subsequent similar installations, notably that on the rocket-firing Typhoons of Falaise fame.

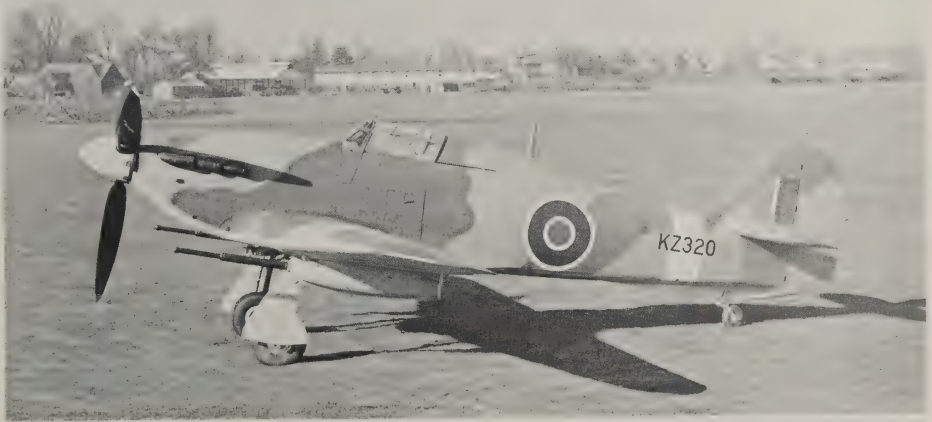
Since 1939 both Rolls-Royce and Vickers had been engaged in the development of quick-firing 40-mm. anti-tank guns as much for use by ground forces as by air. The relatively light weight and compactness of the gun was not overlooked by

D.T.D. (Arm) at the Ministry of Aircraft Production late in 1940 and, after having satisfied itself that a realistic gun installation was likely to be ready shortly, the Air Staff approached Hawkers early in May 1941 with the suggestion that two Vickers Type "S" guns might be fitted under the wings of the Hurricane Mark II. On 30th May design work on the installation started at Esher, and on 11th July the first drawings were issued to the Experimental Shops at Kingston. The following month the first pair of guns was delivered to Langley where they were fitted to the external store T.I. machine, Z2326. First flight, carried out by Seth-Smith, was on 18th September at an all-up weight of 7,460 pounds, and the following day the aircraft was delivered to Boscombe Down. In addition to the anti-tank guns, two Browning .303-inch machine guns were retained in the normal gun bay and, firing alternate ball and tracer ammunition, were used for sighting of the larger guns.

Following this installation Hawkers were asked, on 8th December, to adapt their design to cater for two Rolls-Royce B.F.—belt-feed—40-mm. guns and these were also fitted on Z2326. The Vickers guns differed from the Rolls-Royce version in that they carried fifteen rounds per gun compared with twelve on the latter. When, in 1942, Mark IID's were issued to the R.A.F. almost all were shipped overseas, only No. 184 Squadron in the United Kingdom being so equipped—and then



Z2326, the prototype Hurricane IID, actually an early Mark II used for external store trials, fitted with unfaired Rolls-Royce B.F. guns (top picture) and unfaired Vickers "S" guns (lower picture).



Fully representative of the final Standard of Production, this Hurricane IID, KZ320, is armed with Vickers 40-mm. anti-tank guns and features reflector gunsight. Most of these aircraft were, however also fitted with tropical filters.

## THE HAWKER HURRICANE

initially with the Rolls-Royce armed version. The first ninety-two Hurricane IID's (all built at Langley) to reach the Maintenance Units were provided with the normal Mark IIB/C armour protection, but in July 1942 Hawkers were instructed to increase the weight of armour by 368 pounds, giving an all-up weight of 8,218 pounds.

Development of the Hurricane to carry rocket projectiles was a lengthier process than that of the Mark IID, although it involved the Hawker design team less. Much of the development of the installation was performed at Boscombe Down, while Hawkers simply prepared a small number of aircraft with wing attachment points for the launching rails, firing selector switches in the cockpit and the associated wiring. However one or two of the aircraft which were involved in the "long-charge" anti-shipping rocket trials were fitted with metal-clad ailerons.

In October 1941 Hawkers were asked to prepare three Hurricane II's for carriage of six three-inch R.P.'s each, and the first aircraft selected (a Mk. IIA, Z2415) featured a strengthened main spar having been engaged in a series of terminal velocity diving trials. With full gun armament fitted, but with only R.P. attachment points, this machine was flown by Crosby Warren at Langley on 23rd February 1942 and delivered to Boscombe Down a day or so later. It was followed by two tropical aircraft, BN583 and BN902, during March.

The rockets, fitted and fired at Boscombe Down, on those early aircraft were rudimentary weapons simply consisting of a forty-pound cast iron shot screwed into the end of a length of three-inch iron pipe containing the propellant; for the tail, three rectangular fins were bolted to the pipe. Considerable difficulty was encountered in aiming the missiles, the gravity drop being excessive due to the rear propellant burning moving the centre of gravity progressively forward. This was partly overcome by igniting the charge at the forward end and discharging through a central orifice. The tail was also changed to a simple cruciform. As the A. & A.E.E. trials progressed the warhead weight was increased to sixty pounds and the number of rockets carried by each aircraft to eight.

However, although the British three-inch R.P. with a sixty-pound warhead wrought great execution during the last two years of the War, it remained a difficult weapon to use; yet despite its poor ballistic characteristics and archaic aerodynamic qualities it was still much used in the Royal Air Force seventeen years later!



*Two views of the first rocket-equipped Hurricane, Z2415. Fitted with three rails under each wing, this Mark IIA is seen here during trials at Boscombe Down in February, 1942.*

These then were the basic Hurricane II variants. Improvements and additions continued to be demanded from Hawkers throughout 1942; the Hurricane had by then become outclassed as an interceptor fighter in Northern Europe, though elsewhere it continued in that role—particularly at sea. The emphasis had shifted towards the close support—in more recent parlance, ground attack—role. Apart from the 500-pound H.E. bombs, the Hurricane could carry two Small Bomb Containers (S.B.C.'s), capable of accommodating a number of fragmentation or training bombs, or two Smoke Curtain Installations (S.C.I.'s)—these being used on several of the combined operations in Europe during 1943 and 1944. Much work was also carried out both at Langley and Boscombe Down to clear the Hurricane for loads mounted asymmetrically, that is to say the Hurricane IIB and IIC equipped with an auxiliary fuel tank under one wing and a bomb or rocket projectiles under the other. (An unofficial attempt by No. 184 Squadron to operate with one 40-mm. gun and four R.P.'s almost ended in disaster, for when the gun was fired so severe was the yaw induced that the rockets and rails on the other side broke away from the aircraft!)

The Hurricane II was adapted for two other

duties from 1941 onwards, the modifications required being almost exclusively carried out by the Service. For reconnaissance, development followed the pattern already set by the Hurricane I. Three variants were produced to perform, roughly speaking, tactical-, fighter- and photographic reconnaissance roles. All originated in the Middle East in 1941. The so-called fighter reconnaissance version retained the normal Mark IIA, IIB or IIC armament but in addition featured either a forward-facing F.24 or cine camera in the starboard wing root. The tactical reconnaissance variant often had the armament removed or reduced and featured two oblique F.24 cameras with 8-inch lenses mounted in the rear fuselage. The photographic reconnaissance Hurricane—often flown at altitudes above 34,000 feet—had all armament removed and three cameras (one vertical and two oblique) with 14-inch lenses in the rear fuselage. The fuel capacity was increased to 194 gallons by the addition of extra tanks in the wings. The prototype P.R. Mk. II, *DG613/G* (a Mark I converted to a Mark IIA Series 1) was prepared at Heliopolis, Egypt, in May 1941 and was shortly after delivered to No. 2 Photographic Reconnaissance Unit.

The other duty for which the Hurricane II came to be used was Meteorological Calibration (or “metcal”), again principally in the Middle East. These aircraft, usually stripped of armament, gunsights and armour, featured a psychrometer strut and regularly climbed to heights of 30,000 feet or more, twice a day, month in and month out, to provide weather information for the whole of the Middle East theatre, until in 1945 the “Met.

Flights” were either stood down or converted on to Spitfires.

#### The Hurricane Marks IV and V

One other basic production Hurricane variant was manufactured in the United Kingdom—the Mark IV.\* Its background was as complicated as it was lengthy, for although initial proposals were formulated in mid-1941 the prototype did not fly until 1943.

The original idea, as put forward by M.A.P. in June 1941, was for a Hurricane to be developed specifically for “low attack” or close support duties in North Africa. In view of the increasing trend towards composite squadrons (that is, squadrons simultaneously equipped with Hurricane fighters, fighter-bombers and reconnaissance fighters) it was decided to introduce a new universal wing, wired for any external store but including an internal armament of two Browning machine guns only. It was never intended to supersede the Hurricane IIB and IIC, the 12-gun and 4-cannon wings eventually being made capable of attachment to the new Hurricane.

It was also proposed to follow up the development of a “wide tolerance” long-life tropical Merlin,

\* Rapidly increasing production of the Packard-built Merlin in the United States prompted the Ministry of Aircraft Production at the end of 1941 to issue instructions for the introduction of the Packard Merlin 28 into the Langley production lines, the aircraft to be known as the Hurricane III. Though the necessary modifications were drawn up and retained for possible use in the future, adequate supplies of Rolls-Royce-built engines were maintained and no Hurricane III ever came to be built as such. The Packard Merlin 28 had, however, been introduced in the Canadian Hurricane Marks X and XI.

*Below: a non-standard Hurricane IV fighter-bomber, KX877, with ground-boosted engine.*



## THE HAWKER HURRICANE

intended to be impervious to dust ingestion and up-rated to give 1,400 b.h.p. at low altitude. Such an engine never materialised due principally to the easing of low altitude speed requirements and to improvements in the Merlin oil filter which thus rendered design of a new engine superfluous.

By the time detailed design of the new Hurricane, known then as the Mark IIE, had started in March 1942, new armament variations (the anti-tank guns and R.P.'s) were being introduced and the provision for these further complicated the new wing. Furthermore, in view of the close support duties already being performed, it had been found necessary to provide the front fuselage with additional armour protection and this was extended to include the radiator, which itself had been deepened to give improved cooling in the tropics.

Thus by January 1943, as the prototype neared completion, provision of a new engine (the Merlin 32), new wings, tropical equipment and increased armour prompted a change in designation and forthwith the Mark IV was adopted (though some Service publications still referred to the Mark IIE for several months).

At this late stage a further complication was introduced, that of specifying the greatest possible use of components interchangeable with those of the Spitfire IX! Though this requirement was abandoned shortly after, the prototype did fly from time to time with such items as a Spitfire-type (Rotol R/5/4S/4) four-blade propeller, and tailwheel, as well as a number of internal equipment components.



*Additional armour protection on a rocket-firing Hurricane IV.*



*KZ193 as a Hurricane IV with Vickers anti-tank guns and tropicalised Merlin 27 with Rotol R.S.5/11 three-blade propeller.*

## DEVELOPMENT OF THE HURRICANE MARK II

First flight of the prototype, *KX405*, was undertaken by Lucas on 14th March 1943 from Langley at an all-up weight of 7,215 lb., without external armament or stores, but with tropical filter and additional armour. A second T.I. aircraft, *KZ193*, was flown by Lucas on 23rd March, this being powered by a Merlin 27 driving a Rotol R.S.5/11 three-blade propeller. Armed with two Vickers "S" guns this aircraft was more representative of the production version, having an all-up weight of 8,180 pounds.

Production machines started to appear by the third week in April and continued on the lines until July 1944, being interspersed with Mark IIB's, IIC's and, for a short time, IID's. One Mark IV was built for approximately every three Mark II's during the period of its production and

a total of five hundred and twenty-four Mark IV's were built for the Royal Air Force. Most aircraft were powered by 1,620 b.h.p. Merlin 27's although some of the later machines had Merlin 24's rated to give the same power.

Hurricane IV's were about equally distributed amongst the R.A.F. at home, in the Middle East and the Far East, together with a batch of nearly one hundred shipped to Russia. Some of the aircraft which served in the Italian campaign of 1944 were subsequently shipped out to Burma in time to support the final advance southwards on Rangoon.

Shortly after the T.I. Mark IV, *KZ193*, had flown the Merlin 27 was replaced by a ground-boosted Merlin 32 driving a Spitfire-type Rotol 10 ft. 9 in. diameter four-blade propeller. Rated



*KZ193, as the first Hurricane V prototype, fitted with ground-boosted Merlin 32 and four-blade Rotol propeller.*



*NL255, the second Hurricane V prototype.*

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*An early tropical Hurricane IV with eight 3-inch rocket projectiles. Such aircraft went into action with R.A.F. squadrons in the Mediterranean theatre towards the end of 1943.*



*This late-series Hurricane IV, KZ706, was fitted with the large "Long Tom" rocket projectile for tests over the Pendine Sands at the end of the War.*

to give something like 1,700 b.h.p. at sea level, this powerplant bestowed a maximum speed of 326 m.p.h. with tropical filter and anti-tank guns fitted. Known as the Hurricane Mark V, KZ193 was joined by a similar machine, NL255 (also a converted Mark IV, but now regarded as the first of a proposed production batch), but after lengthy Service evaluation at Boscombe Down, during which repeated and severe overheating seriously shortened the engine overhaul period, the ground-boosting scheme was dropped. One or two other Hurricanes (for example, KX877) were temporarily modified with ground-boosted engines though none was strictly a Mark V. Both KZ193 and NL255 were returned to Mark IV standard.

Though from a point of view of operational flexibility the Hurricane Mark IV was undoubtedly a more useful aircraft, it never achieved the popularity of the Hurricane II. The increased wing loading and decreased power loading, resulting from the provision of armour round the front fuselage and radiator, reduced the crispness of control. On one composite Hurricane squadron the sobriquet "gunbus" was intended as a derogatory reference to the Mark IV. Nevertheless, many a Japanese tank reached the end of



*The anti-tank Hurricane IV.*

its useful life on a dusty road in Burma as the result of a rocket or shell fired by a Hurricane.

## Chapter 9

# NORTHERN EUROPE—THE SWING TO THE OFFENSIVE

It is difficult to state exactly when the Battle of Britain ended, for large-scale daylight raids continued to be flown against this country for some weeks after Hitler had announced, on 17th September 1940, his decision to postpone indefinitely his planned invasion of Great Britain. Moreover even before this implied admission of defeat the heavy night attacks on London which had started on 7th/8th September, marked the start of the "Blitz".

The last heavy daylight attack on the capital was made on 30th September and shortly afterwards it became clear that the pressure was easing. Despite perfunctory raids by small sections of high-flying fighter-bombers between then and the end of October, Fighter Command set about a general re-deployment of its squadrons; new squadrons were formed, not for defence now but in preparation for the swing towards the offensive.

As well as the squadrons of "free Europe"—the Czechs, Poles, Norwegians and the others—some of which had already gone into action towards the end of the Battle, the first of the squadrons manned almost entirely by American volunteers was announced on 8th October. Under the generic title of Eagle Squadron, No. 71 formed at Kirton-in-Lindsey in North Lincolnshire with Hurricane IIA's during the following ten days and commenced working up by operating patrols over the east coast.

Other units, not so quick to achieve operational status, spent much of their time performing that multitude of oft forgotten tasks without which a defence organisation would be lost. For instance No. 91 (Fighter) Squadron, born out of No. 421 Flight at Gravesend in October, moved with its Hurricanes and Spitfires to the partly-operational station at West Malling\* where it carried out meteorological observation climbs, coastal gun-

nery spotting and security patrols over the Straits of Dover. At the end of the year it gave up its Hurricanes (old Mark I's) and converted entirely to Spitfire II's.

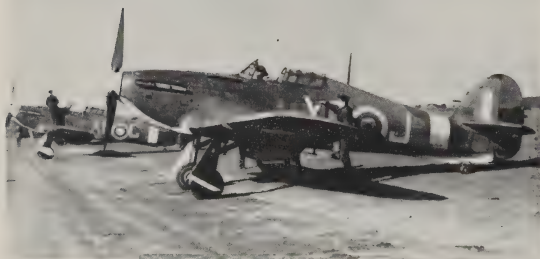
October and November were a period of transition; it was as if Fighter Command itself could scarcely bring itself to believe that it had passed its greatest test. Its Hurricanes and Spitfires, now redeployed in such a way as to provide constant standing patrols against isolated "sneak" raids over a wide front, returned time after time without so much as a sighting. From one of these on 16th October, Sgt. Kosarz of No. 302 (City of Poznan) Squadron—one of the Polish units recently formed—was returning in cloud to his base at Heston in Hurricane P3935 when his wing struck a barrage balloon cable. Such was the force of impact that the cable penetrated as far as the starboard aileron hinge and sliced fourteen inches off the wing tip. The Hurricane was slewed round and immediately went into a spin; after a few moments however the pilot managed to recover and landed at base without further ado.

Then, in postscript to the Battle of Britain, Italy's *Regia Aeronautica* attempted a *tour de force* on 11th November as if to demonstrate its prowess to the *Luftwaffe*. Having spent some time assembling in Belgium (during which a few tentative sorties were flown towards Britain's shores) the *Corpo Aereo Italiano* mounted its first—and as it transpired, its last—major raid against this country.

The approach of a large formation heading for the coast of Suffolk was reported by radar and forthwith four Hurricane squadrons, Nos. 17, 49, 249 and 257, were scrambled to intercept.

\* West Malling had been heavily raided during the Battle of Britain while construction of the airfield was still in progress.

## THE HAWKER HURRICANE



*Hurricane IIA Series 1's of No. 71 (Fighter) Squadron at the end of the Battle of Britain.*

Imagine the surprise of the pilots, for so long used to the redoubtable Bf 109E fighter escorts provided by the *Luftwaffe*, when they found forty Fiat C.R.42 biplane fighters escorting ten Fiat B.R.20 bombers. There were, however, one or two Bf 109's thrown in for good measure. The massacre which followed may be judged from No. 257's record,

... Flt. Lt. Blatchford (Hurricane V6962), on running out of ammunition attacked a C.R.42 by ramming it, milling the enemy's top wing with his propeller. The total bag of aircraft destroyed by the Squadron was as follows: Plt. Offs. North (V6864) and Mortimer (P2835) shared a B.R.20; Plt. Off. North shared a B.R.20 with a pilot of No. 46 Squadron; Plt. Off. Davey (V7607) shared a B.R.20 with a pilot of No. 46; Plt. Off. Pniak (V7292), one B.R.20;

Sgt. Barnes (V6873), one C.R.42; Sgt. Lucas (R4088), one C.R.42; Plt. Off. Pniak shared a B.R.20 with Plt. Off. Kay (V6680); Plt. Off. Kay shared a B.R.20 with Plt. Off. Andrews; Plt. Off. North, one Bf 109E.

None of the intercepting Hurricanes was lost and the Italian air force never returned again in force to these shores.

By the end of November the Blitz was in full swing. Hardly a night passed without raids by the *Luftwaffe*, usually directed against London but with increasing frequency against the provincial and industrial towns of the Midlands and the West Country. November also saw the introduction of the first radar-equipped Beaufighters and the first enemy night raider to be destroyed by this combination fell on the 19th.

Nevertheless deliveries of the new radar-carrying night fighters were perforce too slow to have much immediate effect, nor were the Defiants of Nos. 141 and 264 Squadrons (which had been transferred to night fighting after their *débâcle* in the Battle of Britain) yet able to demonstrate their undoubted compatibility with the night fighting role.

More as a gesture of reassurance to the long suffering civilian populations of our larger cities than a material step in the strengthening of our night defences, Hurricane and Spitfire squadrons were distributed throughout the country and took off night after night on patrol, their pilots relying on their night vision or, in clear skies, the indications of searchlights. This procedure was not new for in the preliminary stages of the Battle of Britain some of the day fighter squadrons had flown at night, but due to the wastage of aircraft in relation to the results achieved—not to mention



*During the Blitz. A Hurricane I night fighter preparing to take off during the winter of 1940-41.*

the strain imposed on pilots and groundcrews—the night operation of Hurricanes and Spitfires had dwindled. Now, with increasing reserves of men and machines and a slackening in the enemy's daylight attacks, night fighting became more than an *ad hoc* contribution by the Hurricane to the defence of Britain.

However, train as they might, the Hurricane pilots achieved precious little at night during those winter months of 1940-41; the radar was still unable to give accurate information of the enemy over land and the reports by the Observer Corps, whose valuable contribution to the defences was recognised in 1941 by the award of the prefix "Royal", were of insufficient accuracy to enable pilots of the single-engine fighters to approach within sighting distance of an enemy aircraft at night. Searchlights and anti-aircraft fire were usually considered to be the best indications of the enemy's presence and their lethal characteristics were such that our pilots seldom hesitated from entering gun defended areas! Occasionally a pilot would spot a night raider illuminated by the fires which raged below in the town it had bombed, as witness this account of a night engagement by No. 96 (Fighter) Squadron:

Sgt. MacNair (in Hurricane N.F.I. V7752) took off at 20.30 hrs. from Cranage to patrol Liverpool at 12,000 feet. He was circling the fires in full moonlight and perfect weather when suddenly he saw a Heinkel He111K flying southwards. MacNair, who was going north-eastwards at the time, turned and gave chase . . . approaching to within 75 yards behind and below the enemy's tail . . . he got the Heinkel well in his sights and gave the enemy two bursts of about four seconds each. Straightaway the Hurricane's windscreen was covered in oil . . . MacNair then broke away observing that the Heinkel's port engine was emitting a great quantity of smoke . . . a second attack was made from astern at about 75 yards range, a four second burst being pumped into the German bomber which was losing height and almost out of control. It was finished off with a beam attack from the port side in which the Hurricane pilot used up the rest of his ammunition. The Heinkel crashed in the neighbourhood of Widnes.

When the engagement was finished Sgt. MacNair found that he had come down to 3,500 feet and he carefully manoeuvred himself out of the balloon barrage and set course for home. After having been up for 2.40 hours his tanks were nearly dry but, by nursing the engine and fuel, he touched down before the engine cut.

Such events as this night victory were rare early in 1941 and the *Luftwaffe* roamed the night skies

of Britain with little interference while our radar-carrying night fighter crews got the measure of their new equipment. But necessity proved to be the mother of invention and a new scheme was evolved by Wing Commander W. Helmore; this involved the use of a powerful airborne searchlight mounted in the nose of a twin-engine radar-carrying night fighter (usually Douglas Havocs, but also Beaufighters and others) which would operate in close company with a Hurricane. It was proposed that the larger aircraft would use its radar to approach the night raider and illuminate it with the searchlight, while the accompanying fighter carried out the actual attack.

The scheme was finalised remarkably quickly and ten flights of "Turbinlite"-equipped Havocs were formed; however, despite long and tedious training the procedure was never perfected operationally and few, if any, successful encounters with the enemy resulted before the winter night offensive ended in 1941. Among the Hurricane squadrons engaged in these flights were No. 1 (Fighter) Squadron with early Hurricane N.F. IIC's flying from Tangmere in the south-east, and No. 43 (Fighter) Squadron also with N.F. IIC's flying from Acklington with Havocs of No. 1460 Flight in the north-east.

While German bombers roamed over Britain at night British light bombers had also kept up incessant attacks against the ports of northern



*A pair of Hurricane IIC's set out at dusk on an intruder sortie.*



*Early Hurricane IIC day fighters of No. 3 (Fighter) Squadron; this squadron was engaged in offensive sweeps during 1941.*

Europe. Towards the end of the Battle of Britain priority had been given to the "invasion ports" of France and Belgium—the ports from which Hitler's invasion fleet would have sailed; whenever opportunity was presented small formations of Blenheims attacked concentrations of sea-going barges, often with excellent results despite their small bombs and bombloads. Preoccupied with other matters, *Luftwaffe* fighters were seldom much in evidence and casualties among our bomber crews were attributable in the main to anti-aircraft fire.

As the German daylight attacks petered out in October 1940, however, the presence of enemy fighters over France and the Low Countries brought a sharp increase in casualties among our light bomber crews whose aircraft had never been outstanding where defensive armament was concerned. And so our short-range fighter squadrons

took on the new and unaccustomed task of bomber escort, a task for which neither Hurricane nor Spitfire was particularly suited, until the introduction of long range fuel tanks.

Also started shortly before the close of 1940 were daylight anti-shipping patrols in which Hurricanes and Spitfires swept up and down the French coast attacking with gunfire any vessel which they happened across. This later became regularised into a set operation—known as "Channel Stop"—aimed at paralysing all movement of enemy shipping in the English Channel.

Named after similar tactics of the First World War, *Circuses* were also introduced by Fighter Command during the winter of 1940–41 and, together with operations cryptically code named *Rhubarbs*, were aimed at luring the *Luftwaffe* fighters into the air and into combat. Often these operations would take the form of squadrons of Hurricanes—now equipped with 250-pound bombs—attacking targets close to known enemy fighter bases in the hope that Spitfires, patrolling above, would be in a position to pounce on any would-be interceptors.

That famous Hurricane squadron, No. 46, whose exploits in Norway had been among the finest in Fighter Command's history, was one of the first to engage in *rhubarbs*. Despite being based as far north as Sherburn-in-Elmet, in Yorkshire, the Squadron sent detachments south to Manston, Tangmere and their satellites, sometimes to take their turn in the tedious day defence patrols, but often flying sweeps or escorting Blenheims over the French coast. In February 1941, however, the Squadron was informed that it was soon to be re-equipped with Spitfires and

shortly afterwards the first of its new aircraft was delivered; one of the last operations with its old Hurricane I's was carried out on 10th February in which they escorted Blenheim IV's of No. 59 Squadron, Coastal Command, in a raid on Calais (losing one aircraft, V7443). Two months later the Squadron was flying Spitfires.

By the spring of 1941 the Hurricane I had almost given way to the Mark IIA and IIB in offensive sweeps. By May fifty-six squadrons of fighters and fighter-bombers were regularly participating, of which twenty-nine flew Hurricanes. Standard patrol lines over northern France were drawn up and allotted to each of the forward airfields and satellites. It was becoming increasingly perilous for the *Luftwaffe* to move about without risk of meeting the Hurricanes and Spitfires. Often very large formations consisting of three, four or even five squadrons would rendezvous at Manston, Kenley, Biggin Hill or one of the other airfields in Southern England, before setting out to shoot up some enemy airfield. Sometimes, usually when there was adequate cloud cover in case of difficulties, only two or four aircraft would be sent out in the chance of meeting up with a stray enemy transport or spotting an enemy motor transport convoy. For instance, on 22nd May Plt. Offs. Ogilvie and Malczewski of No. 601 (County of London) Squadron, flying Hurricane IIB's from Manston, came upon a Junkers Ju 52/3m over France; they quickly put two of the three engines out of action but were forced to turn and defend themselves against a pair of Bf 109's which now attacked; Ogilvie

destroyed one and the other soon made off. When last seen the Ju 52 was losing height only 250 feet above an extensive forest with a safe landing apparently impossible.

#### Iceland and Russia

While Hurricanes continued to execute their share in operations over Britain and northern France, two other theatres (both strictly in northern Europe) were featuring this ubiquitous fighter and, in order to maintain the chronological sequence, it is to them that we now turn our attention.

After it had become obvious that Norway was to be abandoned to Germany in May 1940, British forces were sent to occupy Iceland on the 10th of that month to frustrate any further moves by the Germans in that direction. These forces remained in Iceland until on 7th July 1941 it was announced in Washington that United States troops were to take over the garrison duties. Among the British forces which had been stationed at the airfield at Kaldadarnes since August 1940 was No. 98 (Bomber) Squadron, equipped with Fairey Battles and which had been engaged in a multitude of duties which ranged from air/sea rescue search patrols to meteorological observation flights. Now, in July 1941, to No. 98 fell the task of providing air cover for the withdrawal of British forces, for which purpose four Hurricane IIA Series 2's (Z4037, Z4045, Z4048 and Z4049) were despatched in crates from No. 47 Maintenance Unit in the United Kingdom.

At the end of July No. 98 Squadron as such



*Hurricane IIA Series 2's of No. 1423 Flight (previously part of No. 98 (Bomber) Squadron) at Kaldadarnes, Iceland, in 1941.*

## THE HAWKER HURRICANE

stood down and returned to Britain, leaving behind at Reykjavik one Flight, and this was now formed into No. 1423 Flight. In the first week of August five more Hurricane IIA's (Z4607, Z4617, Z4631, Z4639 and Z4702) were received and assembled, and the Unit settled down to the routine of cover patrols over the main port of Reykjavik and the two airfields nearby. Some excitement occurred on the 20th when a Heinkel He 111 (presumably a reconnaissance machine) flew over and, on this and several subsequent occasions that the aircraft returned, it always managed to elude the Hurricanes by judicious use of cloud.

The patrols continued without further incident (except that Z4607 crashed on 23rd September) until by the end of the year the principal components of the British garrison had left. No. 1423 Flight was disbanded on 19th December and its aircraft were shipped back to Britain the following month aboard the s.s. *Crane* for storage at No. 41 M.U.

It is not beyond the bounds of possibility that the presence of a Heinkel over Iceland during the latter half of August 1941 was in some way connected with the sailing of the first convoy round the North Cape to Arkhangel'sk with arms for Britain's new ally—Russia.

Germany had opened its offensive against Russia on 22nd June 1941, the attack prompting Churchill to pledge support "for any man or State who fought against Nazi-ism". It was planned that such aid as was possible from home

stocks should be sent by sea round the North Cape and into the Russian ports of Arkhangel'sk, Petsamo and Murmansk. However since Finland now sided with the Axis these northern ports became endangered by German thrusts from that country, and it was a matter of urgency to send fighters to defend the convoys from air attack whilst unloading. Hurricanes were chosen.

While munitions and other stores were being assembled two new Hurricane squadrons, Nos. 81 and 134, were formed at Leconfield as No. 151 Wing on 12th August under the command of a New Zealander, Wg. Cdr. H. N. G. Ramsbottom-Isherwood. Their aircraft—thirty-nine Hurricane IIB's—were collected from Hawarden and twenty-four embarked in flying trim aboard H.M.S. *Argus* at Liverpool. The remaining fifteen were crated and stowed as deck cargo in other ships. The groundcrews and other squadron personnel embarked in the s.s. *Llanstephan Castle* and the convoy set sail on the 21st. Arriving at Murmansk on the 28th, the twenty-four Hurricanes were flown off the *Argus* and landed at Vaenga, an airfield about twenty miles distant. Enemy air activity however prevented the convoy from being unloaded and the ships carrying the groundcrews and crated aircraft were diverted to Arkhangel'sk, 400 miles further east. Thus each squadron was split in half, the airworthy fighters at Vaenga without groundcrews, and the crated machines a full sortie distance away and lacking the normal facilities for assembly.



R.A.F. Hurricane IIB's in North Russia during the autumn of 1941.



*One of No. 151 Wing's Hurricanes after the onset of the Russian winter, shortly before the aircraft were handed over to the 72nd Regiment.*



*Now displaying Russian markings this Hurricane IIB is armed with only eight guns. The tropical filter is evidence of the original Middle East destination.*

Notwithstanding, by a combination of remarkable Soviet improvisation and hard work by the groundcrews, the aircraft at Arkhangel'sk were eventually assembled and flown to join the rest of the Wing at Vaenga within about a week. Operation by the Wing was, however, far from straightforward. To begin with, the Hurricanes from the *Argus* had only been fitted with six or eight machine guns each in order to reduce weight, and when two Russian destroyers arrived bringing the spares from Arkhangel'sk it was found that the gun blast tubes and rear seats would not fit (having been taken from Hurricane Mark I's). This was remedied by the Soviet authorities immediately and the same evening enough blast tube adaptors for the entire Wing had been manufactured in local workshops.

Two aircraft of No. 134 Squadron carried out a patrol of enemy-held territory (only about thirty miles from the airfield) on 11th September, despite an armament of only eight guns apiece. Both pilots (Flt. Lt. Ross in Z3763 and Plt. Off. Cameron in Z3978) had narrow escapes when, as

a result of inferior Russian petrol, their engines cut out several times over enemy ground. Only when they were a few hundred feet up did the Merlins respond to feverish priming and subsequently bring the rather apprehensive pilots back to Vaenga.

The following day No. 81 Squadron went into action as five Hurricanes (this time with only six guns apiece) attacked five Messerschmitt Bf 109E's and shot down three, losing one pilot; the enemy fighters were covering a Henschel Hs 126 which was also damaged. The pilot killed on this sortie was the only member of the Wing to lose his life in action throughout its stay in Russia, although on 27th September a tragic mistake cost two groundcrew members their lives. The two men had, as was the custom, been holding down the tail of BD825 while the pilot commenced a run-up of the engine; unaware that the men were still clinging to the aircraft, he taxied forward and took off. Stalling at about fifty feet, the machine crashed killing the two airmen and severely injuring the pilot.

No. 81 Squadron, by 15th September, was flying sixteen Hurricanes fully-armed with twelve guns (albeit after further trouble, this time with grease which had clogged the gun mechanisms in the low temperatures and which necessitated complete dismantling). The following evening eight Hurricanes took off to cover the return of some Russian bombers . . .

. . . at 18.55 hours eight Bf 109E's were intercepted when about to attack the Russian bombers. The C.O. attacked a Bf 109E with a two-second burst, hitting the radiator, and chased it for about five minutes using up all his ammunition. After further attacks by Sgt. Sims and Sgt. Anson, the enemy aircraft crashed. Sgt. Anson was then attacked by Russian fighters and had to take evasive action. F/Sgt. Haw made a stern attack on a Bf 109E without visible effect but after a three-second burst from a quarter-attack at 150 yards the enemy caught fire. Plt. Off. Bush out-turned another Bf 109, setting it on fire with a two-second burst; after another short burst the enemy aircraft crashed.

On 26th September No. 81 Squadron was again in action, shooting down three enemy aircraft—this time Bf 109F's. This victory, achieved without loss, was all the more noteworthy as the enemy fighters dived on the Hurricanes from above while the latter were flying escort to Russian bombers, yet by out-turning the German aircraft and carrying out head-on attacks they overcame the Messerschmitts' advantage in speed. By the

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Canadian-built Hurricane X's, AF964, AG111 and AG162, serving in the United Kingdom.

end of the month No. 81 Squadron had achieved twelve victories for the loss of one pilot, and a further four had fallen to the guns of No. 134 Squadron.

The Arctic winter set in towards the end of September and during October German air activity in the area of Vaenga died down. The time had thus arrived to train Russian pilots to fly the Hurricanes and thereafter hand the squadrons' aircraft over to the Soviet air force. By the end of November the training was complete and the Wing's duty completed; leaving behind a small staff of signals personnel, the British pilots and groundcrews returned to the United Kingdom.

The foregoing has been a relatively detailed account of the fortunes of but two Hurricane squadrons, yet these thirty-nine machines were the vanguard of thousands of British and American aircraft which were supplied to Russia from almost every theatre of War. The Hurricanes of No. 151 Wing were handed over to the 72nd Regiment of the Red Naval Air Fleet, commanded by Captain Safonov, further Mark IIB's being shipped to Murmansk during the winter of 1941-42. Altogether 2,952 Hurricanes (or slightly more than a fifth of the total number built) were supplied to Russia, including 210 Mark IIA's, 1,557 Mark IIB's (including 12-gun Canadian-built aircraft), 1,009 Mark IIC's, 60 Mark IID's and 30 Mark IV's. The remainder was probably made up of *ad hoc* deliveries from Middle East stocks as it is known that the greater proportion of Mark IID's was supplied from Maintenance Units in that theatre.

Many Russian adaptations of the Hurricane were carried out though unfortunately few details are now available; for instance, due to the large number of American fighters supplied to Russia some Hurricanes were adapted to mount 0.5-inch machine guns. Several two-seaters were evolved, including one with a dorsal gun position, and a trainer which was used by the Free French Regiment on the Eastern Front. At least one Sea Hurricane IA was taken over by the Russians; V6881, a catapult fighter from the s.s. *Empire Horn*, landed at Arkhangel'sk after a successful action with an enemy aircraft shadowing convoy PQ18.

### Channel Sweeps, 1942-44

1942 was the heyday of Allied fighter-bomber squadrons based in Britain. The Hurricane II, now completely out-moded as an interceptor day fighter at home, was enjoying great success in its



*Arming the Hurricane. Left, armourers load a Mark IIC with 20-mm ammunition. Right, 250-lb. bombs are mounted on a Mark IIB.*

role of ground attack fighter. Rhubarbs, anti-shiping patrols, bomber escort and intruder operations all came into the Hurricane's repertoire.

Unfortunately the year opened inauspiciously with the escape of the German warships *Scharnhorst*, *Gneisenau* and *Prinz Eugen* from Brest in conditions of bad visibility. By the time the enemy ships had been spotted and identified few fighter squadrons were at Readiness, but among those that took part in the operations were No. 1 (Fighter) Squadron with Hurricane IIC intruders at Tangmere and No. 607 (County of Durham) Squadron with Mark IIB bombers at Manston. Six aircraft of No. 1 Squadron took off in bad visibility and found part of the enemy destroyer screen, but the pilots were unable to claim any damage and lost two of their number (Z3774 and BD949). Four Hurricane bombers of 601 Squad-

ron were vectored too far south to find the enemy capital ships, but in the low cloud stumbled across a number of small *flak* ships. One of the pilots (F/Sgt. Walker) secured a direct hit on one vessel with a 250-pound bomb but his aircraft was evidently caught in the *flak* for he did not return to base.

Perhaps the mantle of darkness did much to cloak the achievements of the intruder Hurricane pilots, yet the results of night sweeps were often as spectacular as those of the daylight operations. No. 1 (Fighter) Squadron was among the most successful of the Hurricane squadrons and its star pilot in these night sorties was a Czech, Flt. Lt. K. M. Kuttelwascher. Typical of this pilot's achievements was his sortie during the night of 4th May 1942. Taking off from Tangmere in Hurricane IIC (BE581) JX-E with two 44-gallon



*A Hurricane IIB night fighter.*

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*Hurricane IIC night fighter/intruders of No. 87 Squadron. Above: BE500, "Cawnpore I", with Sqdn. Ldr. D. C. Smallwood, D.F.C. Below: an Australian pilot, Sgt. B. Bawden, with a long-range Mk. IIC intruder. Pictures taken during the winter of 1941-42.*

drop tanks at 23.20 hours, he crossed the French coast near Fecamp at 2,000 feet (at Fecamp some searchlights came on but were doused when he flashed his navigation lights!). Flying on south he came up to the airfield at St. André, lit with a double flarepath, round which about half-a-dozen aircraft with tail lights were circling. Identifying these as Heinkel He 111K's, Kuttelwascher slipped in behind one and fired a two-second burst, whereupon the enemy's starboard engine burst into flames and the aircraft crashed just outside the airfield. He repeated these tactics with a second and third aircraft but lost sight of the latter after having seen the Heinkel losing height steeply. On coming round in orbit, Kuttelwascher found three separate fires burning fiercely on the ground.

Anti-shipping patrols were a tedious but nevertheless vital part of the "Channel Stop" campaign to paralyse enemy shipping activity along the French coast. All types of aircraft participated,

ranging from Liberators from Coastal Command to the Typhoons, Spitfires and Hurricanes of Fighter Command. Occasionally their constant vigilance was rewarded, as for instance on 15th May 1942, when eight Hurricane IIB's (with bombs) of No. 175 Squadron (only formed at Warmwell three months before) took off from Ibsley to attack shipping reported off Cap de la Hague—

... our chaps made a thorough job of this as there were three minesweepers when they arrived and only one when they left, and she must have sunk later as she was very badly damaged. The other two received direct hits, blew up and sank ...

Such was the high proportion of operations over the Channel which fell to the Hurricane squadrons' lot that it was not unnatural that they should take a considerable share of the support responsibility in the famous Dieppe landings of 19th August. In terms of casualties, both among the troops landed and the aircraft engaged, the raid was disappointing to say the least, yet the experience it afforded in the conduct of combined operations was essential for the planning of the ultimate assault in the liberation of Europe. It was hoped that the large numbers of Allied aircraft which were committed at Dieppe would tempt the *Luftwaffe* into the air; this was in fact achieved though the losses were in the ratio of about two to one in the enemy's favour. Apart from limited participation by the Typhoon (only recently introduced into an offensive role and one which emphasised a serious structural weakness) the Hurricanes of twenty-four squadrons were involved to a greater or lesser extent.

It was the Hurricane IIC's of No. 43 (Fighter) Squadron which, in the Tangmere Sector, were first into the attack at Dieppe. Coming to Readiness at four in the morning, No. 43 carried out four complete squadron sorties during the day. The first raid, flown by twelve pilots led by the C.O., Sqdn. Ldr. de Vivier, was a beach-level sweep attacking coastal gun positions, buildings and radio stations. The enemy had been alerted and the *flak*—from both light and heavy guns—was intense. All the pilots reported strikes on gun positions, defence buildings and radio masts, but of the twelve that had set out, one pilot (F/Sgt. H. Wik, a Canadian in *BD712*) was missing, Plt. Off. A. E. Snell baled out and was picked up by a rescue launch and Flt. Lt. F. W. Lister had to make a wheels-up landing back at Tangmere. Four of the other nine Hurricanes sustained severe damage from the *flak* but returned safely.

Three months later this famous squadron took part with its Hurricanes in Operation "Torch"—the Allied landings in French North Africa.

As has already been stated in Chapter 8, No. 184 (Fighter) Squadron was the only home-based Hurricane squadron to receive Mark IID aircraft with 40-mm. anti-tank guns. These arrived on the newly-formed squadron (commanded by Sqdn. Ldr. J. Rose, D.F.C.) at Colerne during December 1942. The Squadron, however, was not committed to operations with these machines but spent the early months of 1943 working up and taking part in local army exercises, during which it evolved the pattern of army support tactics which were employed to such good effect with the Hurricane Mark IV, similarly armed. Later, of course, rocket-firing Typhoons assumed this role and were to contribute measurably to the Allied victories in Normandy in 1944.

During May and June 1943 both Nos. 137 and 184 (Fighter) Squadrons received Hurricane IV's which, with their universal "low attack" wings, could mount either 40-mm. guns, 500-pound bombs, three-inch rockets or combinations of these weapons.

The first rhubarb employing the 40-mm. guns was carried out by No. 137 Squadron on 23rd July 1943. Although based at Milfield in Northumberland, detachments were flown to Southend and Manston whence the fighters carried out their operations. The attack on the 23rd was flown by Flt. Lt. J. M. Bryan, D.F.C. (in KX827), Fg. Offs. G. S. Chalmers (KW918), J. T. Davidson (KZ662) and Plt. Off. A. G. Brunet (KZ661), each aircraft armed with 40-mm. guns. . .

. . . the four aircraft took off from Manston at 13.10 hours and landed safely at 15.00 hours. The Belgian coast was crossed in cloud at 1,500 feet, 2 miles west of Nieuport and a goods train was attacked near Cotemark by all pilots and the engine disintegrated. Two other goods trains were found at Statistrate. F/L Bryan and F/O Chalmers attacked one, seeing strikes and leaving it covered in dirty black smoke. P/O Brunet and F/O Davidson dealt with the other, resulting in its engine's disintegration with the boiler knocked off the bogies. Intense light flak was experienced here. Near Lighter-velde P/O Brunet and F/O Chalmers shot up a large army lorry. At Thielt a small train was attacked by all pilots and left emitting smoke. Two barges were cannoned next and badly damaged, and the four aircraft returned to Manston. (Less than a month later F/O Davidson was accidentally shot down by a friendly fighter and killed.)

Six days later No. 184 Squadron flew four



HW719, a Hurricane IID of No. 1 School of Specialised Low Attack at Milfield, near Berwick. A photograph taken in January, 1943.

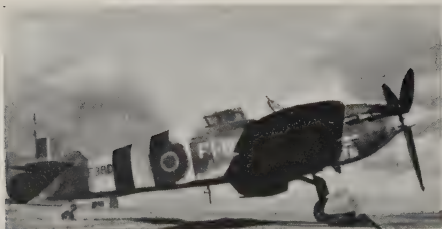


KX413, "H"-How, an anti-tank Hurricane IV of No. 164 Squadron based at Middle Wallop. This squadron was, in mid-1943, engaged in anti-ship sweeps over the English Channel.

Hurricane IV's, each armed with eight rockets with 60-pound H.E. warheads, on an anti-shiping patrol from Manston under an escort of Typhoons. On arrival at the Dutch coast the fighters came across a small convoy of five enemy ships and the Typhoons went into the attack with cannons, immediately drawing the flak from the rocket-firing Hurricanes which were hardly fired upon until the attack was nearly over. The rockets sank two of the ships (one of about 1,000 tons) and another was left beached and burning fiercely; the other two vessels were also hit. One Hurricane was lost.

On 2nd September it was No. 137 Squadron's turn to use rockets when four aircraft together with eight similarly-armed Hurricanes of No. 164 Squadron (and escorted by Typhoons of Nos. 3 and 198 Squadrons) attacked and destroyed lock gates at Hansweert in Holland—but losing Fg. Off. J. L. De Houx (in KZ576). No. 164 Squadron itself converted to Typhoons the following month.

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LF380, a Hurricane IIC of the Gunnery Flight, No. 83 O.T.U. at Peplow, Shropshire. The photo was taken in about October, 1944, shortly before this Bomber Affiliation O.T.U. converted to No. 23 Heavy Glider Conversion Unit—a measure necessitated by the heavy losses incurred at Arnhem.

By 1944 almost all the Hurricane squadrons had been re-equipped with later aircraft. Typhoons, Spitfires, Mustangs and the other famous fighters

all took their place on squadrons whose Hurricanes had brought them fame. Occasionally the Hurricane was given a new lease of operational life as, for instance, was the case with No. 63 (Fighter) Squadron. This unit had started the War in No. 6 Training Group, Bomber Command, but later converted on to Spitfires. During the first two months of 1944 it was performing tactical reconnaissance in Mustang I's and IA's but gave these up on 31st May for long-range Hurricane Tac R Mark IIB's and IV's. Six days later, flying from Lee-on-Solent, these aeroplanes were patrolling the Normandy beaches, engaged in the highly specialised and all-important task of naval bombardment spotting in the greatest seaborne assault history had ever known.

And so the Hurricane passed out of action in northern Europe yet, as told in Chapter 13, it continued to give faithful service in more peaceful skies for many months to come.



In-flight views of the Hillson F.H.40 "Slip-wing" Hurricane (see also drawing on Page 169). Using an old Hurricane I (originally L1884 which was sent out to Canada, re-registered as 321 and returned to the U.K.) this scheme was intended as a means of providing extra lift for take-off from small airfields. The top wing was then jettisoned in flight. The scheme was abandoned in 1943.

## Chapter 10

# THE MEDITERRANEAN—THE SWING TO THE OFFENSIVE

We return now to the Mediterranean and North Africa to follow the fortunes of the Allies in the series of campaigns which, after final victory in Tunisia, led on through Sicily and Italy, and back into the Balkans.

It will be remembered that the Greek campaign at the beginning of 1941 had, by its demands on Allied forces in Cyrenaica, cost us our recently-acquired gains; the arrival of German land and air forces in Libya had made possible enemy pressure which carried the fighting back to the Egyptian frontier. Yet Malta had been reinforced and Tobruk remained isolated behind the enemy's lines.

Throughout all these campaigns the Hurricane Mark I had constituted the principal Allied fighter aircraft, but during the Spring of 1941 the first Mark IIA's and IIB's were reaching M.U.'s in the Canal Zone and by June some squadrons had received the new machines. New squadrons were constantly forming, among them a new fighter reconnaissance unit with Hurricanes—No. 451 Squadron of the Royal Australian Air Force. Tobruk, from time to time, accommodated that indefatigable squadron, No. 73, and its Hurricanes were constantly in action defending the garrison from dive bomber raids and performing offensive patrols as far as Mersa Matruh.

Meanwhile, during the spring and summer of 1941, Hurricanes were in action against the Italians in East Africa. The successful campaigns of January–March that year had split and isolated the enemy forces in Abyssinia into three main areas, destroying much of their equipment and thus releasing further Allied forces for the defence of hard-pressed Egypt to the north. Now and until November the South African Air Force squadrons, under the command of Air Commodore W. Sowrey, engaged themselves in the elimination of

these areas of resistance. Among the squadrons committed was No. 41, S.A.A.F., flying Hurricanes (together with aged Hawker Hartbees biplanes), this unit being particularly engaged at Aksum, Alomata and Debarec during August. By November, however, the last Italians had surrendered and No. 41 was on its way to take part in Operation Crusader—about to be launched in the Western Desert.

The period August–November 1941 had been spent in building up the Desert Air Force. At last the philosophy of integrated operations with land and air forces had been learned and henceforward the two would be mutually supporting; gone were the days of "Army Co-operation" squadrons—the few specially-trained support squadrons working with the land forces; in future the whole Desert Air Force would operate in concert with the army and its requirements, whether these be considered as cover for the front line troops or defence of rear



*This Hurricane I, V7670, was abandoned to the Germans during March 1941 in North Africa. As the tide of fortunes changed, the Eighth Army came upon it later on Gambut airfield.*



*Among these replacement Hurricane IIC's are the three aircraft presented by Lady MacRobert in memory of her three sons, all of whom lost their lives flying during the War.*

supply bases. It was in this support role—rather than the pure interception role—that the Hurricane Mark II was to excel from then until the end of the Mediterranean campaign.

By mid-November, on the eve of Operation Crusader—the action to relieve the British garrison at Tobruk—out of forty fighter squadrons in the Middle East, twenty-five possessed Hurricanes (of which twenty flew Mark II's). Among the recently formed was No. 335 (Hellenic) Squadron, with officers and men from the Royal Hellenic Air Force, which was now working-up with its Hurricanes at Aqir in Palestine. Within four months they were in action over Cyrenaica.

"Crusader" opened on 18th November with powerful thrusts by the Eighth Army towards Tobruk. In support, Hurricanes of Nos. 33 and 208 Squadrons flying from Landing Grounds 122, 123, 124 and 126 south of Sollum, proved invaluable. No. 33 caught and successfully attacked large concentrations of Italian motor vehicles south of Tobruk and enemy aircraft on the ground at El Adem. The following day Hurricanes and Lysanders of 208 Squadron sighted and returned with photographs of about 1,800 vehicles and 80 tanks of the Italian Ariete Division on the Allied left flank. On the 20th four Hurricanes of No. 451 Squadron, R.A.A.F., were detached and flown into the perimeter of Tobruk and these camera-equipped aircraft maintained communications patrols with the relief columns approaching from the south-east. One of the Hurricanes flew in to



*Based at El Alamein late in 1942, this Mark IIC (with only two 20-mm. guns) of No. 213 Squadron was flown on long range escort duties.*

Tobruk with instructions for the garrison to break out the following day. During the course of the link-up with the relief forces on the 21st the *Luftwaffe* attempted to interfere and carried out heavy attacks in support of enemy ground forces, now threatened with isolation east of Tobruk. The Hurricane fighter-bombers of Nos. 33 and 80 Squadrons, quickly divested of external stores, rose to meet the attack and destroyed eight of the enemy without loss to themselves.

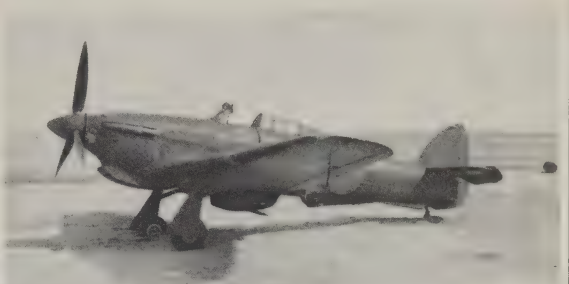
Rommel, however, faced with the threatened loss of two *Panzer* divisions, fought back viciously and a week later Tobruk was again isolated from the main Allied forces. Nevertheless the Germans were now more concerned with disengagement and in the face of continued attacks by the Desert Air Force the enemy divisions withdrew and escaped

westwards and Tobruk was once again relieved. It was during these actions by the Allied aircraft on 29th November that Fg. Off. P. T. Cotton of 208 Squadron put up a particularly fine display of airmanship. Flying an unarmed Tac R Hurricane (Z4063) on reconnaissance over the enemy-held airfield at El Adem, he was attacked by two Bf 109E's. For thirty minutes he warded off their combined attacks until, with ammunition expended, they made off. Cotton's engine, however, had not been equal to the strain, and seized up when only fifteen miles from base. He made a perfect forced landing in the desert without further damage to the aircraft which was later salvaged and repaired. This action earned the pilot the D.F.C.

During the first two weeks of December Rommel strove to establish a defence line based on Gazala. While his forces maintained a fighting withdrawal to this line the *Luftwaffe* attempted to provide cover. Among the Hurricanes which flew constant patrols were those of No. 274 Squadron, and a particularly frenzied action was fought by twelve of its aircraft against twenty Bf 109F's and Fiat G.50's. In the course of the fight one of our pilots, Lt. Hoffe of the S.A.A.F., received a bullet in his glycol tank which caught fire and forced him to bale out. Another pilot, Flt. Lt. Tracey, seeing Hoffe reach the ground in no-man's land, landed his Hurricane beside the South African, picked him up and brought him home, seated in his lap! Three Bf 109's were destroyed by the Squadron.

A week later 274 was again in action near El Adem when eight Hurricane II's met a formation of fifteen Ju 87's escorted by eighteen Messerschmitt Bf 109F's, Fiat G.50's and Macchi C.202's. Three Ju 87's, two Macchi's and a Fiat were destroyed for the loss of three Hurricanes. One of our pilots, Sgt. Parburvy, spotted a Ju 87 landing to pick up the pilot of another, which had force landed, and proceeded to destroy both aircraft. Two evidently couldn't play that game!

One of the lesser-known units flying Hurricanes at this time was No. 2 Photographic Reconnaissance Unit, formed in June 1941 at Heliopolis with three locally-modified Hurricane P.R. Mark I's\*. First engaged in reconnaissance over Syria, the unit moved to Tobruk in November and commenced flights of over eleven hundred miles, bringing back vital information about enemy supply convoys arriving at bases far behind the lines. Often airborne for five hours at a time these Hurricanes constantly operated at heights of over 33,000 feet until, in August 1942, they were replaced by P.R. Spitfires.



*A Hurricane P.R. Mk. II (DG630, previously a Mark I, V6535) of No. 208 (AC) Squadron photographed at Kabrit in 1942. Note the ventral camera housing.*

"Crusader" had succeeded. By mid-December 1941 the Eighth Army was attacking Rommel's line on Gazala. By the 17th this had broken and once more the Desert forces swept towards Benghazi. One by one the familiar airfields at Gambut, El Adem, Derna, Benina, Msus and Antelat were occupied by our squadrons. On these and the other airfields in Cyrenaica our pilots found no fewer than four hundred and forty-eight enemy aircraft, either destroyed or damaged by our air attacks or simply abandoned in the enemy's haste to disengage.

Once more, however, the Allied advance was halted, again at El Agheila. Again the demands of other war theatres compromised the Allied efforts in North Africa—this time they were the outcome of dire events in the Far East for, on 7th December 1941, Japan had entered the War. By 21st January 1942 Rommel had managed to concentrate sufficient forces for a major counter-attack and, in delivering this, caught the Eighth Army unawares. Nor, due to severe floods on the forward airfields, could our fighters take off with bombs and ammunition to support our troops during the first two critical days of the German offensive. Only by laying emergency strips at Antelat were our pilots able to fly out at the last moment before the enemy columns arrived. The Hurricane and Kittyhawk squadrons promptly moved to Msus whence they gained air superiority once more over the battle area; five squadrons of Hurricanes, Nos. 1

\* W9116 (a "non-tropicalised" aircraft with three 14-inch cameras in the rear fuselage, guns removed and extra wing fuel tanks giving a total capacity of 194 gallons) was lost over Benghazi on 3rd October 1941. V7423 and V7428 were similar but only carried two 8-inch cameras. A fourth aircraft, W9353, was issued as replacement for W9116. Later other P.R. Hurricanes, Z2412, Z4182, Z5132, DG613 and DG622 were also used. They were painted matt-blue overall.



## THE MEDITERRANEAN

(S.A.A.F.), 30, 94, 238 and 274, carried out constant low level attacks with bombs, cannon and machine guns despite appalling weather, yet dust storms did not prevent the fighters from destroying or damaging 120 enemy lorries on the 26th.

The German advance had nevertheless gained momentum and, under cover of a particularly severe storm, moved on Benghazi on 28th January. Once more No. 73 Squadron had to move out of Mechili at short notice. And so it went on, this time the withdrawal finishing in mid-February on Rommel's old Gazala-Bir Hakim line.

Meanwhile the disposition and content of the Hurricane squadrons had been undergoing

changes. No. 6 Squadron, which had been flying Hurricanes and Lysanders in the support/reconnaissance role, was ordered back to Helwan in the Canal Zone to re-equip with Hurricane IIC's. Shortly afterwards the squadron was notified that it was to commence working-up as an anti-tank unit with Mark IID's and received its first six aircraft (*BN797, BN841, BN842, BN846, BN860* and *BN861*)—the first of their type to arrive in the Middle East). No. 73 Squadron, now equipped with Mark IIB's and IIC's, was based at El Adem and engaged in interception duties. No. 208 Squadron, having recently been turned out of Antelat, Msus and Tmimi, was flying reconnaissance sorties, also from El Adem. During the

## MEDITERRANEAN THEATRE

SHOWING PRINCIPAL HURRICANE  
FIELDS AND AREAS OF OPERATION

## THEATRE

course of one of these, Plt. Off. C. S. B. Montagu, in an old Mark I P2646, was intercepted by two Messerschmitt Bf 109F's . . .

. . . He successfully evaded four attacks and held one of the enemy in his sights for a long burst after which it broke away and lost height in the direction of Tmimi. The other abandoned the chase on passing over our own anti-aircraft guns which now fired on P/O Montagu; his Hurricane was hit in the oil and coolant systems. The engine seized and Montagu made a successful wheels-down landing on difficult ground. Attempts were made to tow the aircraft twenty-three miles to his base, but one wheel burst after twelve miles and the machine has had to be abandoned as no spare wheels are available . . .

Shortly afterwards another pilot of No. 208 Squadron had a narrow escape in Hurricane Z4486. Plt. Off. J. Moss, D.F.C., during take-off at overload weight, raised his undercarriage before becoming fully airborne. The aircraft sank on to the ground, bending all the tips of the propeller blades and damaging the port wing tip. Plt. Off. Moss managed to regain control and continued his take-off, carried out a circuit and landed the heavy aircraft safely.

The Gazala-Bir Hakim defence line held firm until May when, on the 26th, a Hurricane pilot of No. 40 Squadron, S.A.A.F., sighted strong Italian forces moving up towards our positions just inland from Gazala. That night three German divisions moved round the left flank of the British line south of Bir Hakim. Heavy fighting broke out here the following day and shortly afterwards the 1st Free French Brigade was isolated. For ten days the gallant French garrison resisted enemy attacks, while overhead our Hurricanes, Tomahawks and Kittyhawks warded off large formations of Junkers Ju 87's which attempted to dive-bomb the fortress into surrender.

It was in this battle that No. 6 Squadron, with its anti-tank Hurricane IID's, was called up from the Canal Zone and went into the attack with deadly effect. Such was the enormous concentration of artillery round the garrison, however, that the efforts of a few Hurricanes were of little avail. Other Hurricanes dropped supply canisters to the defenders, but the situation had become hopeless and the garrison was ordered to withdraw on the night of 10/11th June.

Thus the Gazala line broke, yet the ten days' respite gained by the French at Bir Hakim enabled the Eighth Army to retire without undue trouble back into Egypt. This move was accomplished



*Hurricane IID's of No. 6 Squadron near Helwan 1942.*

## THE HAWKER HURRICANE



*Seen here on a Maltese airfield, this Gloster-built Hurricane IIA Series 2, BG766, carried 250-lb. bombs for an offensive sweep over Sicily. It was flown and maintained by naval personnel.*

under constant cover from our fighters so that hardly a single enemy aircraft appeared over the straggling motor convoys. No. 6 Squadron was, by now, warming to its task and on the 15th four Mark IID's led by Wg. Cdr. R. Porteous attacked and destroyed five tanks, five lorries and an anti-tank gun near Mersa Matruh. In the heat of battle one of the pilots, Flt. Lt. Hillier, after having destroyed a tank, accidentally struck it with his aircraft as he pulled away from the attack, losing his tailwheel and the bottom half of his rudder. Notwithstanding the Hurricane responded to the controls and brought its pilot safely home.

By the end of the month No. 6 Squadron had destroyed twenty-six tanks, thirty-one armoured troop carriers and many other lorries, bowisers and guns, etc. But now the Eighth Army was successfully resisting Rommel's thrusts at a new line anchored at its northern end at El Alamein.

### Malta, 1941-42

Little has been said thus far of the part played by the island of Malta, nor of the exploits of its indomitable defenders. It may be recalled that when the Allied armies overran Cyrenaica for the first time during the winter of 1940-41, the opportunity was seized to send a handful of Hurricanes to the island direct from forward bases in North Africa.

*Fliegerkorps X*, recently established on bases in Crete, had joined the *Regia Aeronautica* in massive attacks against the island and its harbours—all told some two hundred and fifty enemy aircraft being thrown against a target no more than sixty miles from their bases and defended by the equivalent of one fighter squadron. Since the relief of those three intrepid Sea Gladiators in mid-1940, the island's defence had rested entirely on Hurricanes—an odd assortment of old Mark I's

spared from home stocks and brought, at considerable risk, by aircraft carrier into the Mediterranean for formation into No. 261 (Fighter) Squadron.

The weight of attacks, however, was so great that it was little time before the number of Hurricanes on the airfields at Hal Far and Takali had dwindled to a mere dozen, and the six machines sent from Cyrenaica did no more than bring one Flight up to its established strength.

Not a day passed during March 1941 without a visit by *Fliegerkorps X*, and under these attacks it was decided that bomber operations from the island were no longer possible so the remaining Wellington squadron was withdrawn. Now that Malta was without means of striking at Rommel's shipping—carrying supplies to the German forces in Africa—the fury of enemy air activity over the island abated.

Now it was Malta's turn to receive Hurricane II's and during the first week in April a dozen of the new aircraft reached 261 Squadron. Previously the Hurricane I's had been outfought by the Bf 109E's which, with the bombers, usually approached the island from above 16,000 feet. Now the Mark IIA's, with their improved climb, met the enemy sooner and on more than equal terms; straightway the bombing lost much of its accuracy and within a fortnight the Wellingtons returned.

Events in the central Mediterranean once more swung in our favour. The large convoy (mentioned in Chapter 7) was able to sail from Gibraltar to Alexandria with fifty Hurricanes for the Western Desert. H.M.S. *Ark Royal* flew off about twenty Hurricanes to Malta on 27th April, and another convoy with further Hurricanes among its cargo put into Grand Harbour on 8th May under cover of bad weather.

Now, with about fifty Hurricane IIA's and IIB's,

Air Vice-Marshals F. H. M. Maynard, commanding the air forces on Malta, was able to form a new Hurricane squadron and, on 12th May at Hal Far, No. 185 (Fighter) Squadron came into being out of a nucleus provided by No. 251 Squadron and No. 1430 Flight.

As Germany turned her gaze towards Moscow in May so *Fliegerkorps X* was withdrawn to the Balkans and Crete—its task in Sicily still far from accomplished. Thus the first phase of Malta's war was ended and her strategic position athwart the enemy's line of communication with North Africa could now more freely be exploited.

From June until mid-December 1941 Malta was able, without material interference by the *Luftwaffe*, to build up its resources and generally refurbish its battered installations. On 21st May another Hurricane squadron arrived, No. 126 (Fighter) Squadron docking at Kalafrana from the United Kingdom. Hurricane IIC fighter-bombers arrived during June and all three squadrons took a number of these aircraft on strength.

First success for the cannon-armed Hurricanes came to No. 126 Squadron on 30th June when it shot down two Macchi C.200's, and No. 185 destroyed two and damaged three more without loss on 4th July—the Squadron's first combat over the island.

At about this time the Hurricane squadrons went over to the offensive, attacking targets in Sicily . . .

Hal Far, 9th July 1941. No. 185 Squadron. Four Hurricanes (S/L Mould, S/L Rabagliati, F/L Jefferies and Sgt. Mackay) took off to straf the seaplane base at Syracuse . . . Having between them destroyed six flying boats, damaged four others and severely shaken everyone in the neighbourhood of Syracuse, S/L Mould broke the world's low flying record (four inches above the sea) from Syracuse back to Malta.

About a fortnight later, on the 26th, Italy took a turn at attacking Malta from the sea. Half a dozen E-Boats, supported by a number of Macchi C.200's, attempted a raid on shipping in Grand Harbour, Valetta. Nos. 126 and 185 Squadrons' Hurricanes went into the attack with most gratifying results. Flt. Lt. Lefevre, by singling out one ship and carrying out repeated attacks, so unnerved the crew that it ran up the white flag. Plt. Off. Winton of No. 185 Squadron had to bale out of his Hurricane and, landing in the water, swam to the nearest E-Boat only to find the entire crew dead. "No. 185 Squadron thus captured the E-Boat and kept the Italian marine flag as a souvenir." Between them the Squadron destroyed or captured all the E-Boats and shot down one of

the escorting Macchis.

If the Hurricane pilots on Malta enjoyed the six month respite from the *Luftwaffe's* attention before December 1941, they were to be in desperate straits during the first half of 1942. It was in November and December 1941 that *Luftflotte 2* moved from the Russian front to Rome and under its command came *Fliegerkorps II*, now based in Sicily, *Fliegerkorps X* in the Balkans, and "*Fliegerkorps Afrika*". Up to mid-December the weekly Italian effort against the island had been of the order of about sixty sorties, an effort which hardly justified more than a defence flight of Hurricanes—thus permitting almost all the squadrons' aircraft to be used to better advantage over enemy territory.

At the end of December, however, Kesselring attacked Malta with over two hundred aircraft. Once more the Hurricanes climbed to meet the *Luftwaffe* and, although they still managed to break up the enemy formations and so disrupt their bomb aiming, the German fighter escort—now almost entirely Bf 109F's—was rather more than a match for the Hurricanes. Early in February the daily German effort was increased and in the first week nearly 600 sorties were flown. Once again much of the island's bomber force was withdrawn. Once more the enemy seized the opportunity to send reinforcements across to Rommel, thus providing the means to recapture Cyrenaica from the Allies.

Not content with the forced removal of our bombers, *Fliegerkorps II* dropped about 1,000 tons of bombs on Malta during February, and in March there was only one day on which attacks were not made. Nearly three thousand sorties were flown and over 2,000 tons of bombs were dropped. But it was during March that the first Spitfires reached the island, while the number of serviceable Hurricanes on the three squadrons had dropped to thirty. During April the enemy's efforts were more than trebled and 6,700 tons of bombs fell. In desperation convoys were sailed for relief of the island but pitifully few ships got through. By the end of the month only eighteen Hurricanes remained, though a further forty-seven Spitfires were brought by the American carrier *Wasp*. Eighty more arrived in May.

Clearly the Hurricanes' days on Malta were numbered. No. 126 Squadron, whose pilots had destroyed thirty-four enemy aircraft between August 1941 and February 1942 for the loss of ten aircraft, was the first to fly the Spitfires in March and, by July, the Hurricane had been entirely replaced on the other squadrons as well.

## THE HAWKER HURRICANE

### El Alamein and Operation "Torch"

While enemy pressure against Malta continued in June, further reinforcements were passing across the Mediterranean and with this support Rommel was able to break the British line between Gazala and Bir Hakim. Tobruk had fallen and by the 26th the Eighth Army, under cover of Hurricanes, Kittyhawks, Tomahawks and Beau-fighters, had retired behind the last defensible line in front of Suez—at El Alamein.

When the German and Italian forces encountered the Eighth Army dug in in front of Alamein their advance stopped abruptly; indeed, so far had their supply lines become stretched that it is doubtful whether they could have continued without some pause to replenish petrol and other supplies. Furthermore, unlike the Allied advance into Cyrenaica, the enemy had not been closely accompanied by his air force, the bulk of which still struggled far behind the *Panzers*. Be that as it may, Rommel was content for the moment to dig in facing the new Allied lines, painfully conscious that he was not facing a defeated army, but one which had retreated in good order with its fighting units and equipment intact.

The summer weeks passed and no major attack developed against the Alamein line, principally due to the effect of the Desert Air Force's constant pressure against the enemy supply routes. Meanwhile *Fliegerkorps X*, operating from the Balkans and Crete, carried out sporadic sorties against our airfields and installations in the Canal Zone. One of the most heavily occupied squadrons was yet again No. 73, whose pilots and Hurricane IIB's and IIC's were now entrusted with the defence of Cairo against these day and night raids; during July alone the Squadron, based at Burg el Arab and Heliopolis, destroyed twenty-three enemy aircraft between Suez and El Alamein for the loss of six Hurricanes. No. 208 Squadron, also at Burg el Arab and flying Hurricane P.R.I's and II's and Tac R IIA's, maintained a close watch over the German and Italian lines, losing four aircraft in two months\*. No. 213 Squadron, having hitherto spent much of its time at Fama-gusta in Cyprus since leaving the United Kingdom, now arrived at El Alamein for defence against *Fliegerkorps X* (one aircraft, *BP592*, destroying three Ju 88's during one sortie on 1st September).

\* *P2638*, *Z2328*, *BE709* and *BN156*. The first of these was undoubtedly the oldest Hurricane flying in the Middle East at the time. Converted into an unarmed P.R. Mark I with tropical filter, this aircraft stood little chance when, returning from a lone patrol, it was attacked by three Bf 109F's and shot down near Burg el Arab on 24th July.

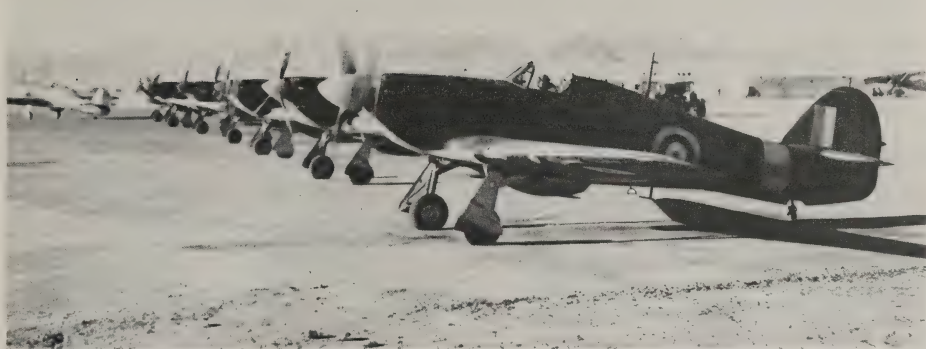
Meanwhile both the opposing armies and air forces were preparing for major assaults at El Alamein, and by October the Eighth Army under its new commander, General Montgomery, was ready. So was Tedder's Western Desert Air Force. Still Hurricanes represented a large proportion of his close support force; of the forty-eight fighter and fighter-bomber squadrons twenty-two flew the Hurricane, though one or two had started conversion to Kittyhawks and Spitfires.

On the night of October 23rd/24th the famous artillery barrage opened up on the German and Italian line. As the troops moved forward six squadrons of Wellingtons bombed enemy armoured concentrations, and the night fighter Hurricanes of No. 73 Squadron ranged over the Italian Trieste and Littorio, and German 15th *Panzer* Divisions in the rear, shooting up the troop carriers and supply dumps. Hurricane IID's of No. 6 Squadron and No. 7 (S.A.A.F.) Squadron joined in with their anti-tank guns.

The battle raged on for five days. Occasionally Ju 87's would put in brief appearances but were promptly dealt with by the Spitfires, Kittyhawks and Hurricanes, being forced to jettison their bombs which often fell upon their own troops. Ground attack Hurricanes were constantly in action; no complete record exists of their effort or success at the Battle of Alamein but, of the eleven squadrons committed during the period October 23rd–November 8th, six together claimed a total of 39 tanks, 212 lorries and armoured troop carriers, 26 bowlers, 42 guns of various sizes, over two hundred other vehicles and four small ammunition and fuel dumps. These six squadrons flew a total of 842 sorties in seventeen days losing eleven pilots.

As the Italians and the *Afrika Korps* finally broke on 4th November, the Eighth Army and Desert Air Force maintained relentless attacks on the enemy columns whose withdrawal turned, within two days, to disorganised flight. They presented the targets for which our fighter-bomber pilots were waiting. The coastal roads leading westwards were so congested with vehicles that pilots who were forced to return home to replenish fuel and ammunition, flew back later to find the same convoy had been unable to move since their previous attack.

The pursuit followed out of Egypt and through Cyrenaica, but now there was to be no halt at El Agheila. Occasionally German tanks would turn and show fight, only to be discouraged by the prompt appearance of Hurricane IID's flying



*Hurricane I's and II's of No. 213 Squadron on Famagusta airfield, Cyprus, during 1942. Only two of these aircraft feature tropical filters.*

in support of the leading Allied forces. Many of the captured German tank crews gave vivid accounts of the effectiveness of the Hurricanes' anti-tank guns; later an enemy document fell into our hands. . .

" . . . Kesselring arrived recently at No. 5 Tank Regiment to inspect a tank shortly after it had been attacked by British aircraft. All the shells had penetrated the tank and one of them (a 40-mm.) was subsequently sent to Rommel and Kesselring, together with a report". (Quoted from No. 6 Squadron Diary.)

To add to the plight of the Axis forces in North Africa, a new venture by the Allies was the major landings of British and American armies on the French Moroccan and Algerian coasts on 8th November 1942. Operation "Torch" was collectively the first large scale combined assault-performed by the Allies in the Second World War and was covered both by the naval units of Force H from Gibraltar and by squadrons of the Royal Air Force, Fleet Air Arm, South African Air Force and the United States Army Air Force. As usual the Hurricane was there in the van of the assault.

One of the initial objectives was to be the airfield of Maison Blanche, a dozen miles from the port of Algiers. This was quickly captured by an American combat team and within an hour eighteen long range Hurricane IIC's of No. 43 (Fighter) Squadron had landed from Gibraltar. Shortly afterwards further Hurricanes and Spitfires of No. 322 Wing joined them. The following evening about twenty unescorted Ju 88's appeared and attempted to attack the port and airfield but,

having received ample warning from mobile radar, the British pilots had already taken off and were quick to engage. In all eleven of the enemy were forced down, three falling to the Hurricanes' guns.

While other landings progressed satisfactorily to the east and west of Algiers, Germany—recognising the trap that had been sprung on her forces in North Africa—was quick to take the opportunity to seize and occupy the key ports in Tunisia. On 10th November a Sea Hurricane pilot sighted large numbers of German transport aircraft on the airfields at El Aouina near Tunis, and Sidi Ahmed near Bizerta. In order therefore to accelerate the Allied advance towards the Tunisian border, two companies of British paratroops were dropped at the airfield at Bone under cover provided by a standing patrol of six Hurricanes of No. 43 Squadron. By the end of December five Hurricane units were operating in North-West Africa, principally from the airfields at Souk el Arba, Bone, Souk Ahras and Youk Les Bains.

Meanwhile the Eighth Army fought and followed the enemy through Tripoli and captured the airfield at Castel Benito on 23rd January 1943. So fast was the advance that Hurricanes were used in a fashion that must be unique among fighter operations; Air Marshal Coningham ordered Nos. 213 and 238 Squadrons with twenty-three Hurricanes to land at airfields far ahead of our advanced columns, whence they attacked with devastating effect *from the rear* of the enemy struggling to disengage from our pursuit. Together these pilots destroyed or damaged about 300 enemy vehicles.

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By March No. 6 Squadron's Hurricane IID's, based now at Castel Benito, were attacking enemy armour making a stand at Mareth. General Leclerc, commanding a force of Free French troops, had travelled hundreds of miles to join up with the Eighth Army, and it was against these forces that the Germans now attacked. One armoured column was spotted by No. 6 Squadron at Zamlet el Hadid on the 10th and twelve anti-tank Hurricanes went into action. In little over two hours the Squadron—without loss—destroyed 6 tanks, 13 armoured vehicles, 10 lorries, 5 half-tracks, a gun and trailer, and a wireless van.

Three weeks later the Eighth Army joined up with the American II Corps and together swept northwards through Tunisia. By May the position of the Axis forces in North Africa was hopeless. An attempt to fly huge convoys of Ju 52's and

Me 323's loaded with fuel to Tunis had met with disaster from the guns of Spitfires and Warhawks. Now all enemy fighters were withdrawn from Africa and von Arnim's forces were left defenceless and at the mercy of every kind of British and American fighter and bomber. By the 13th all enemy resistance had ceased in Tunisia.

Already plans had been formulated for the invasion of Sicily and the next two months were spent in redeploying and reorganising the air forces together under the combined structure of the Mediterranean Air Command. On the eve of the landings in Sicily this command controlled no fewer than 267 squadrons, of which 121 were British and the remainder were American. How the Hurricane came to be re-deployed in the Near and Middle East can best be shown in the following table.

No. 6 Squadron	.. ..	Anti-tank and ground support duties.	Mark IID's. Temporarily withdrawn to Egypt to work up on Mark IV's.
No. 32 Squadron	.. ..	Interceptor duties	Day defence of North Tunisia and convoy patrols. Mark IIC's.
No. 33 Squadron	.. ..	Interceptor duties	Day defence and convoy patrols, Eastern Mediterranean. Mark IIC's.
No. 73 Squadron	.. ..	Night fighting and intruder duties.	Based in Central Mediterranean with detachment on Malta to cover landings in Sicily. Mark IIC's.
No. 74 Squadron	.. ..	Patrols and training	Recently moved from North Persia to Mersa Matruh with detachment at Tel Aviv. Mark IIC's. (Converted to Spitfires, 8/43.)
No. 87 Squadron	.. ..	Interceptor duties	Day defence of North Tunisia and convoy patrols. Mark IIC's.
No. 94 Squadron	.. ..	Second line patrols	Eastern Mediterranean. Mark IIB's and IIC's.
No. 123 Squadron	.. ..	Second line patrols	Eastern Mediterranean. Mark IIB's and IIC's.
No. 127 Squadron	.. ..	Training .. ..	Eastern Mediterranean. In process of converting to Spitfires.
No. 134 Squadron	.. ..	Second line patrols	Eastern Mediterranean. Mark IIB's and IIC's.
No. 173 Squadron	.. ..	Communications	North Africa. Various Mark I's and II's, and other aircraft.
No. 208 Squadron	.. ..	Close support .. ..	Training detachments in Iraq and Palestine. Mark IIA's and IIB's.
No. 213 Squadron	.. ..	Convoy patrols .. ..	Based at El Gamil. Mark IIC's. (Converted to Spitfires, 10/43.)
No. 237 Squadron	.. ..	Second line patrols	Eastern Mediterranean. Mark IIC's.
No. 238 Squadron	.. ..	Second line patrols	Western Desert. Mark IIC's.
No. 241 Squadron	.. ..	Ground support duties ..	Tactical bomber force, North Tunisia. Mark IIB and IV fighter-bombers.
No. 253 Squadron	.. ..	Coastal patrols .. ..	Various Mark II's and IV's. Tunisian coasts.
No. 274 Squadron	.. ..	Second line patrols	Eastern Mediterranean. Based on Mellaha. Mk. IIC's.
No. 335 (Hellenic) Squadron	.. ..	Convoy patrols .. ..	Shipping protection, Central Mediterranean. Mark IIC's.
No. 451 Squadron	.. ..	Interceptor duties	Eastern Mediterranean. (Converted to Spitfires, 10/43.)

To these squadrons may be added those of the South African Air Force (which numbered three) and three Met. Flights. It can therefore be seen from the table that by mid-1943 the Hurricane was, generally speaking, being withdrawn from front line combat service and being entrusted with second, line security patrols behind the major battle front in Italy and Sicily. How remote some of these duties may have appeared is well typified by the experiences of No. 74 (Fighter) Squadron—the famous “Tigers”. Late in 1942 the Squadron, already confirmed in its belief that Spitfires were superior to any other fighters, was posted to the Middle East with Hurricanes! Its destination proved to be Meherabad in the remote northern Ustan Cheharum of Persia; it arrived here on 1st December 1942 under the command of Sqdn. Ldr. P. F. Illingworth with a small complement of Hurricane IIB's, but so badly lacking spares and tool kits that not even the long range fuel tanks could be removed! Its duty was to patrol the Persia/Armenia frontier area—a responsibility vested in the R.A.F. since the anticipatory occupation of Persia by British and Russian forces in August 1941 to prevent German infiltration. Withdrawn from Meherabad in March 1943, No. 74 was moved to the Eastern Mediterranean being based in turn at Shaibah, Mersa Matruh and Tel Aviv, and finally equipped with Hurricane IIC's. In August the Squadron returned to Spitfires.

Nevertheless the invasion of Sicily *did* feature the Hurricane night fighters of No. 73 Squadron—yet once more. Flying from Malta these aircraft

ranged along the invasion coast while the airborne forces were being flown in to the assault, their pilots briefed to shoot up any searchlights that might be exposed. However, even this veteran Hurricane squadron was now scheduled for re-equipment and already detachments elsewhere had received Spitfires and were working up.

Last operational squadron to retain its Hurricanes was No. 6 Squadron and, until the end of the War, continued in the ground attack role which it had so successfully performed throughout the desert campaigns. Although the squadron had been temporarily withdrawn eastwards at the end of the Tunisian campaign to work up on the Hurricane IV, and therefore did not participate in the Sicilian landings, it returned to the front line early in 1944, its base being Grottaglie on the heel of Italy. So successful were its operations in support of coastal actions in the Adriatic—using anti-tank guns, rocket projectiles and 500-pound bombs—that it is worth recording the Squadron's score in the first two months:

Destroyed or sunk: 21 schooners, 7 barges, 3 Siebel ferries, 1 landing craft, 1 400/500-ton coaster, 5,000-ton m.v. *Italia*, 1 150/200-ton motor vessel, 1 smaller motor vessel and a German headquarters.

Damaged: 16 schooners, 4 barges, 4 Siebel ferries, 1 landing craft, 1 1,200-ton motor vessel and several dockyard cranes.

With the increasing pressure exerted by the Yugoslav partisan army, which by 1944 numbered about a quarter of a million men and women, it was decided in June to form an autonomous



*Armed with four rockets under the starboard wing and fitted with a drop tank on the port side, this Hurricane IV-LF498, of No. 6 Squadron is seen at Tatoi in Greece towards the end of 1944; it was the aircraft that, "single-handed", destroyed the rail bridge at Spuz during the Balkan campaign at the end of the War.*

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Balkan Air Force. Attached to this was No. 6 Squadron, with its Hurricane IV's based at Grottaglie and with detachments at Canne and Falconara. Performing strikes among the multitude of small islands off the Yugoslav mainland, these aircraft were soon to be joined by Spitfires and Kittyhawks of the Desert Air Force. At the beginning of October six of the Hurricanes were flown to Araxos whence, carrying mixed loads of bombs and rockets, their pilots sought to accelerate the departure of the German army from Greece.

Simultaneously a section of No. 6's aircraft, temporarily operating from the small island of Vis—about three hundred miles up the Adriatic coast—was engaged in guerilla support, endeavouring to disrupt enemy escape roads and railways. In November rocket strikes were flown against enemy concentrations at Risan and near Niksic, and a single Hurricane (LF498) destroyed the rail bridge at Spuz with rockets. The following month Hurricanes were called up by the partisans to attack a German headquarters at Zegar.

On 1st December however the Hurricanes were called up from Araxos in Greece and put down at Niksic—now under partisan control. Three air-

craft were ordered off again on the 3rd to attack enemy armoured columns 280 miles to the north, near the Rijeka (Fiume)—Zagreb road. Flying with four three-inch rockets under one wing and a 44-gallon tank under the other, the pilots spotted five Tiger tanks, destroyed one and severely damaged two of the others. The following day the same three Hurricanes attacked an enemy column, destroying a further tank and two horse-drawn guns.

The two isolated operations are mentioned to illustrate the character of warfare being waged in the Balkans. No front line existed. Occasionally a landing ground would be captured by the partisans simply long enough to re-fuel a section of fighters; it would then be abandoned as soon as they had left.

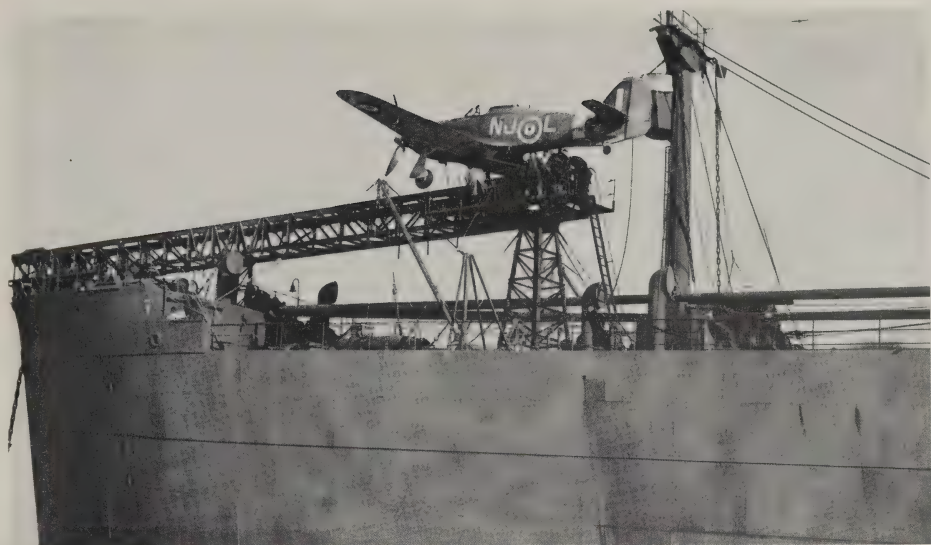
This was the pattern of the Balkan campaign which continued until the end of the European War. Hurricanes remained in the front line until the end: With only a week to go before VE-Day, twenty-five enemy ships surrendered to the rocket-firing Hurricanes of No. 6 Squadron in the Gulf of Trieste. On what more fitting note could the Hurricane's fight against Germany end?



*Left: HV608, one of several tropical Hurricane IIC's supplied to Turkey from Middle East R.A.F. stocks during 1942.*

*Right: LB886, a late production Hurricane IIC handed over to the Yugoslav Partisan Forces in 1945.*





*V6756, a Hurricane I, originally built by Gloster Aircraft Co., Ltd. in 1940, converted to a Sea Hurricane IA and mounted on the forecandle of a CAM-Ship.*

## *Chapter 11*

# THE HURRICANE AT SEA

The history of the naval interceptor fighter was, up to the beginning of the Second World War, complicated by a succession of thoroughly conflicting and often exaggerated design requirements. Having regard for the relatively difficult conditions under which naval aircraft were expected to operate, it is probably true that had the naval air arm been rated as of greater importance and not the subject of perpetual haggling between Air Ministry and Admiralty the shipboard fighter might have led the development of the interceptor genus. That is not to say that the naval fighter would have had a superior performance than its land-based counterpart, for this was unlikely owing to the specialised deck equipment required in the naval design; what is contended is that had the aircraft designer been afforded greater scope and incentive, the ingenuity needed to meet the naval requirements would have generally accelerated progress with the less particular design specifications for the land interceptor.

In more specific terms, so small was Britain's seaborne fighter capacity between the Wars (less than sixty fighters in five aircraft carriers at any one time) that it was hardly surprising that costly and elaborate design could not be amortised in production orders. Examples of such "economics" were to be found in the Nimrod and Roc fleet fighters which undoubtedly suffered the pangs of abbreviated development costs. Indeed the Fairey Fulmar displayed all the signs of budgetary relegation until ultimately spurred by the outbreak of War. On the other hand the deterioration of political relations in Europe in the mid-thirties prompted Britain to seek recourse in the simple adaptation of her best land interceptor—the Gladiator—for shipboard duties and, by European standards in 1939-40, very satisfactory it proved.

On the other hand, what could be done by a nation laying greater emphasis on naval air power was demonstrated by Japan, whose principal military aims were to be achieved by use of highly

## THE HAWKER HURRICANE

flexible naval task forces. The provision of a large number of big aircraft carriers and the defence required for their protection resulted in the design and large-scale production of that superlative fighter, the Mitsubishi Zero-Sen (or "Zeke"). Its appearance so far from metropolitan Japan at the start of the Pacific War came as an unpleasant shock to British and American air commanders for not only did it totally eclipse our naval Fulmars and Sea Gladiators but proved more than a match for our land-based fighters—Buffalos, and soon afterwards, Hurricane Mark I's.

The use of naval fighters in support of land operations, although being pursued by the Japanese High Command, had entirely escaped the attention of the British Imperial Defence planners between the Wars, and this fact coupled with the R.A.F.'s lack of long-range fighters resulted in Britain's inability to participate to any significant advantage in the Norwegian campaign.

It was however Britain's slender contribution to the air fighting in Norway which set in train the events that resulted in a modern fighter being supplied in large quantities to the Royal Navy—the beginning of an evolution which has continued ever since and one that has developed into the very *raison d'être* of the modern maritime task force.

The Nazi invasion of Norway in April 1940 brought sudden realisation by the Air Staff that the R.A.F. possessed no means of supporting a British expeditionary force with home based fighters, nor were the remaining airfields in that country particularly suitable for the operation of short-range interceptors—if indeed any could be shipped over. The decision to send the Hurricanes of No. 46 (Fighter) Squadron and their subsequent successful deck operation was a masterpiece of improvisation, not to mention the skill and bravery of the pilots concerned.



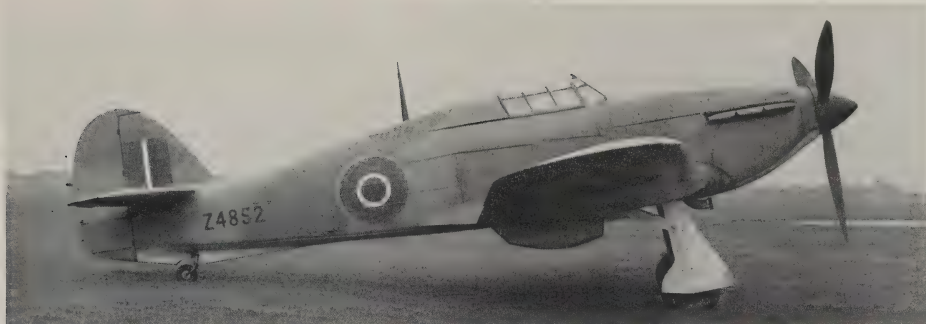
*The lack of long range R.A.F. fighters during the Norwegian campaign brought about a plan (never completed) to fit Blackburn Roc floats to a Hurricane (see page 170).*

The loss of two British aircraft carriers, the *Courageous* and *Glorious*, early in the War, together with an alarming increase in shipping losses resulting from German command of the entire north European seaboard, brought the matter of shipping protection to crisis point by the autumn of 1940. Obviously provision of further carriers could not be sufficiently accelerated to be of immediate assistance and the idea of mounting catapult Hurricane fighters on the fo'c'sles of merchant ships was one of many suggested antidotes against the long-range German maritime reconnaissance bombers that were plaguing our Atlantic convoys.

In October 1940 therefore the Directorate of Research and Development (Air) asked Hawkers to investigate the feasibility of modifying the Hurricane I to incorporate the necessary catapult spools, and was informed that a prototype could be made ready within five weeks. It was not until 19th January 1941 that a decision was made and on that date twenty sets of catapult spools and modification kits were ordered by the Admiralty. Thirty more were ordered a fortnight later.

Simultaneously Hawkers set about converting a repaired Hurricane for deck operation and, equipped with a Vee-frame arrester hook under the rear fuselage together with catapult spools, this "hooked Hurricane" was delivered to the R.A.E. at Farnborough in March 1941. Conversion of the first fifty catapult Hurricanes (known as Sea Hurricane Mark IA's) was undertaken at Hamble in Hampshire and some of these were delivered to the catapult development and training establishment at Speke near Liverpool. One aircraft, P5187, was sent to Langley for performance trials, being flown by Seth-Smith and Watson towards the end of June.

Meanwhile, under the stimulus of specific direction by Winston Churchill who obviously pinned much faith in the scheme, thirty-five merchant vessels were made ready at Liverpool, Bristol, Cardiff and Clydeside. Catapults were mounted on ships of all sorts and sizes, ranging from 2,500 to 12,000 tons; all were now classed as CAM-Ships (catapult aircraft merchantmen). The intention was that two or more CAM-Ships should accompany each convoy (loaded, naturally with their normal cargo as well) and, on the appearance of an enemy reconnaissance bomber, launch their "Hurricat" to intercept. Whatever the outcome of the ensuing combat, the pilot of the fighter was inevitably faced with the difficult choice—whether to set his machine down in the sea in the path of the convoy in the hope that some ship might heave



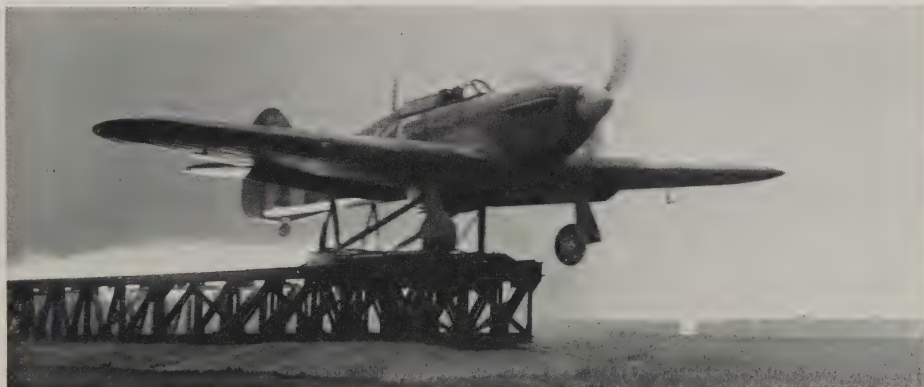
*A Sea Hurricane IA, Z4852.*

to and pick him up, or to attempt to reach land. The distances from land, however, at which the Focke-Wulf Fw 200C Condor usually fell in with our convoys was probably determined so as to be well out of range of shore-based fighters, and though the "one-way" range of the Hurricane was obviously longer the problem of pilot navigation over the sea was responsible for the loss of many an airman. The first pilots to shoulder these unpleasant responsibilities were drawn from volunteers in the Fleet Air Arm and who had acquired some degree of catapult experience on fleet spotting aircraft.

The first CAM-Ship to set sail was the s.s. *Michael E* on 27th May 1941, but in this instance the ship itself was unfortunately torpedoed before the Hurricane could be launched. Shortly afterwards the first Sea Hurricane, piloted by Sub-Lt.

M. A. Birrell of the Fleet Air Arm, was catapulted from a CAM-Ship but no enemy aircraft was destroyed. Towards the end of June a small number of naval catapult auxiliary ships was added to supplement the growing fleet of CAM-Ships and it was from one of these, H.M.S. *Maplin*, that a "Hurricat" destroyed its first enemy convoy raider; on 3rd August 1941 Lt. R. W. H. Everett, R.N.V.R., of No. 804 Squadron, was catapulted off to intercept a Focke-Wulf Fw 200C Condor; this he shot down and was subsequently awarded the D.S.O.

Wastage of Hurricanes was of course high, though by the end of 1941 about six of the long-range German raiders had been destroyed in the North Atlantic. 44-gallon drop tanks were added to the fighters during the autumn—a provision which did much to re-assure the pilots though it



*With partial flap selected, this Sea Hurricane IA is discharged from a rocket catapult at the Catapult Training Unit at Speke in 1941.*

## THE HAWKER HURRICANE

necessitated up-rating the catapults' launching power and materially reduced the Sea Hurricanes' combat manoeuvrability. Also by the end of 1941 most of the Fleet Air Arm volunteer pilots had been replaced on the CAM-Ships by Royal Air Force pilots who had, in the meantime, undergone catapult courses either at Speke or Gibraltar.

Obviously, effective as the catapult fighter scheme proved in reducing the danger to our convoys from bombing attacks, its relative inflexibility (due to the need to hold replacement Sea Hurricanes at distant ports of call) brought about its end quite quickly. The next scheme, or rather one that had naturally taken longer to complete, was for the use of merchant ships converted as small escort carriers, and known as MAC-Ships (merchant aircraft carriers). With superstructure removed and bridge offset amidships, the ship was provided with a simple unobstructed flight deck on which perhaps half a dozen Sea Hurricanes and a similar number of Swordfish torpedo-bombers could be ranged aft. Little but superficial maintenance could be effected as no hangars were provided and the hardy naval aircraft were left exposed to the full fury of Atlantic storm or Arctic frost. It is little wonder that these Sea Hurricanes seldom completed more than thirty or forty flying hours before salt water corrosion rendered as suspect their engines and airframe structures.

The Hurricane developed for operation from MAC-Ships and other carriers towards the end of 1941 was known as the Hurricane Mark IB, this being a version equipped with Vee-frame arrester hook as well as catapult spools, therefore being

applicable either to CAM- or MAC-Ships at foreign ports or storage units. In November that year twenty-five Hurricane IIA Series 2's at Little Rissington were allocated to the Admiralty by the M.A.P. for conversion to Sea Hurricanes and, employing both hooks and spools, were usually referred to as Mark IB's.

By the end of 1941 Sea Hurricane IB's were serving with No. 801 Squadron (embarked in H.M.S. *Argus* and *Eagle*\*), No. 806 Squadron (in H.M.S. *Formidable*), No. 880 Squadron (in H.M.S. *Avenger*) and No. 885 (in H.M.S. *Victorious*). No 803 Squadron, which had been operating ashore in the Middle East in Palestine and the Western Desert, also flew Sea Hurricanes together with its Fulmars, while No. 804 Squadron operated Flights of Sea Hurricanes aboard H.M.S. *Eagle*, *Argus* and *Furious*.

Almost simultaneous with the introduction of the Sea Hurricane IB was the appearance of the Mark IC with four-cannon wings. Despite its relatively heavy armament and Merlin III this version possessed a top speed of 295 miles per hour at slightly over 15,000 feet, and records suggest that by July 1942 the Fleet Air Arm had over three hundred on strength in various parts of the world. The first Mark IC's entered service with No. 811

\* Note. The aircraft carriers in which Sea Hurricanes embarked during 1941-43 were as follows: Fleet Carriers, *Argus* (15,750 tons), *Eagle* (26,400 tons), *Formidable* (29,240 tons), *Furious* (22,450 tons), *Indomitable* (29,730 tons) and *Victorious* (30,000 tons); British-built Escort Carriers: *Nairana* and *Vindex* (both of 13,455 tons); American-built Escort Carriers: *Avenger*, *Biter* and *Dasher* (all of 12,000 tons); *Chaser* and *Striker* (both of 11,000 tons); Light Carrier, *Pegasus* (3,000 tons) and the Maintenance Carrier, *Unicorn* (14,750 tons).



*Merlin III, four cannon and arrester hook identify this, V6741, as a Sea Hurricane IC.*

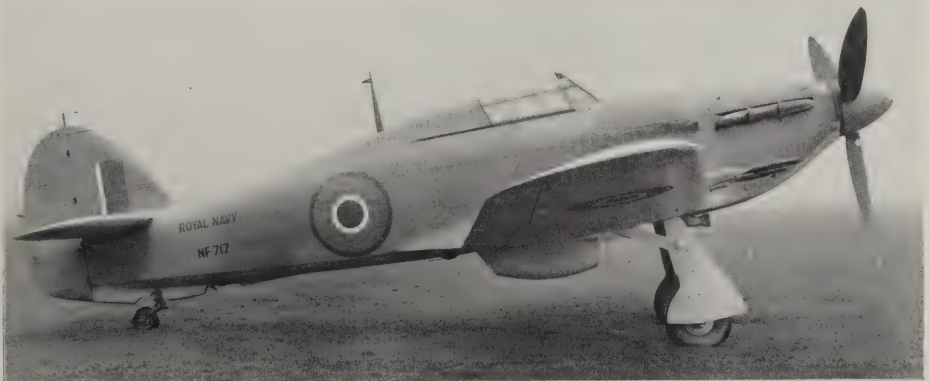


*A Sea Hurricane IC being re-fuelled aboard H.M. Carrier Argus.*

Squadron at Lee-on-Solent in January 1942, a squadron principally engaged in training duties with Vought-Sikorsky Chesapeake dive-bombers. Shortly afterwards others joined Nos. 801, 802 (in H.M.S. *Avenger*), 803 (two aircraft), 880 (in H.M.S. *Furious* and *Indomitable*), 883 (in H.M.S. *Avenger*) and 885 Squadron (in H.M.S. *Victorious*); some tropically-equipped Sea Hurricane IC's were flown up the Takoradi route to join No. 889 Squadron of the Fleet Air Arm based in Egypt and already equipped with Fulmars.

In March 1942 the Admiralty ordered seventy deck conversion sets, these being introduced into various Hurricane Mark IIC's by naval working

parties at Silloth and Aston Down. Further conversions of R.A.F. Mark II's were undertaken by General Aircraft Ltd. during the following three months, the aircraft being almost new and released by the Air Ministry from Maintenance Units (principally No. 5 M.U., Kemble, and No. 13 M.U., Henlow). These machines—Mark IIB's and IIC's—totalled 185, but strictly speaking were not true Sea Hurricanes though the words ROYAL NAVY appeared on their fuselage sides. As they retained R.A.F. radio and were serviced according to R.A.F. schedules they became known as Hooked Hurricane II's. Few, if any, were embarked for operations from carriers and one at



*A late-standard Sea Hurricane IIC, NF717.*

## THE HAWKER HURRICANE

least served (hook and all) with No. 41 Squadron of the S.A.A.F. in the Western Desert!

The Sea Hurricane IIC was first introduced in May 1942, Hawker Aircraft Ltd. performing the trial installation on *BD787* (this aircraft was also fitted with catapult spools though production Sea Hurricane IIC's were not. *BD787* was later classified as a Sea Hurricane IA despite its modification standard and Merlin XX; the reason for this is inexplicable). Full conversion kits, including naval radio, were made available from mid-1942 onwards and thereafter Sea Hurricane IIC's occupied the full attention of General Aircraft Ltd.

Thus by July 1942 the Royal Navy possessed almost six hundred Sea Hurricanes, of which some two hundred were serving afloat, a further eighty were flying on operational duties from shore bases abroad and the remainder were held in reserve at home or were used for training at Lee-on-Solent, Yeovilton, Donibristle, Drem and St. Merryn.

In following the operational career of the Sea Hurricane from the close of 1941 onwards it will, from the foregoing, be seen that to identify the actual versions involved is almost impossible, nor did official records attempt to differentiate; due to the propensity of Mark IC's, however, it seems likely that this version saw most action.

Operations by Sea Hurricanes in 1941 had been confined almost entirely to convoy protection duties on the North Atlantic routes to and from Canada, ready for their "one-way" sorties from the bows of CAM-Ships. As more Sea Hurricane squadrons came to be formed and American-built escort carriers joined the Royal Navy, this precarious type of operation came to be superseded by more orthodox carrier operations. However the presence of greater fighter defences for our convoys came to discourage the persistent attention of German maritime reconnaissance bombers; from about February 1942 onwards therefore, except in cases of very large or important convoys, the number of Sea Hurricanes used on the North Atlantic routes was reduced to permit a larger proportion of anti-submarine and torpedo-carrying aircraft among the restricted complement of the escort carriers.

On the other hand the number of Sea Hurricanes aboard the larger carriers continued to grow, for the presence of one or more fleet carriers in a convoy usually implied that heavy and prolonged air attacks on the convoy might be expected. No better example of such an attack can be found than the action fought by the large convoy which sailed for the relief of Malta in August 1942.

Sailing eastwards from Gibraltar on 10th

August, the convoy consisted of fourteen merchantmen escorted by two battleships, seven cruisers and twenty-four destroyers, together with the fleet carriers *Eagle*, *Indomitable* and *Victorious*. Seventy naval fighters (among them thirty-nine Sea Hurricanes of No. 800 Squadron in H.M.S. *Indomitable*, No. 801 in H.M.S. *Eagle* and No. 885 in H.M.S. *Victorious*, with Fulmars and Martlets as well\*) constituted one of the heaviest fighter defences hitherto provided by Britain for a mercantile convoy, and one that was entirely justified by the hazard of passing so close to the enemy airfields in North Africa and Sicily.

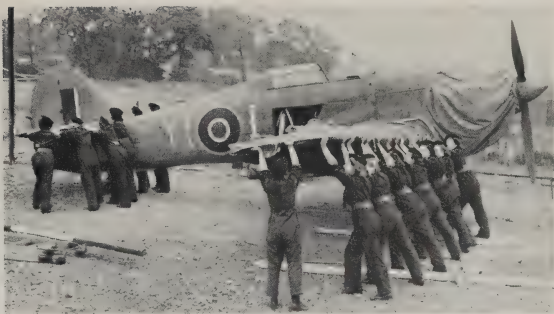
One day out from Gibraltar the convoy came under attack both by U-Boats and aircraft and, despite all the Royal Navy could do, casualties began to mount. The Sea Hurricanes, Fulmars and Martlets were constantly in the air striving to beat off attacks by the enemy aircraft (the total force was estimated at over 500 aircraft, many of them probably operating more than one sortie every day). H.M.S. *Eagle*, veteran of several relief voyages to Malta, was torpedoed and sunk by a U-Boat with the loss of ten aircraft of Nos. 801 and 804 Squadrons; while naval gunners put up a terrific barrage against the Ju 88's and Italian torpedo-bombers, E-Boats and mines took their toll of ships. The battle raged for four days and by the time the convoy reached the protection of long-range Beaufighters flying from Malta, the naval fighters had destroyed thirty-nine enemy aircraft for the loss of eight in air combat. The ships' guns shot down another two. One Sea Hurricane pilot, Lt. R. J. Cork, D.S.C., alone destroyed three German and three Italian aircraft during the course of this hard-fought battle.

The cost in ships and men had been enormous for in those four days an aircraft carrier, two cruisers, a destroyer and nine of the all-important merchantmen had gone to the bottom. In destroying forty-one enemy aircraft we had lost eighteen of our own; yet Malta was saved and thereafter never came so close to starvation and surrender as she had during that summer of 1942.

While this and a previous Malta convoy had undergone preparation, despatch of convoys to Russia via the North Cape had been temporarily suspended. They were resumed on 2nd September with the departure of convoy PQ.18 from Loch Ewe, bound for Murmansk. This convoy, however, was different from its predecessors for now an escort carrier with naval fighters accompanied the merchant ships. (It will be remembered that

\* Note. Fulmars of Nos. 804, 809 and 884 Squadrons, and Martlets of No. 806 Squadron.

*After the introduction of merchant aircraft carriers, Sea Hurricane 1A's were withdrawn for training at shore stations.*



Hurricanes of No. 151 Wing had been carried by the first PQ convoy but were intended for land-based cover when it reached its destination.)

As was expected, no sooner had the convoy PQ.18 come within range of the *Luftwaffe* bases in North Norway than attacks started, but now the Germans found themselves facing a determined defence by twelve Sea Hurricanes of Nos. 802 and 883 Squadrons flying from the escort carrier *Avenger*. Five of the enemy were destroyed for the loss of four naval Hurricanes—of which three pilots were rescued—but this time the convoy managed to reach Russia with little loss.

However by the autumn of 1942 the Sea Hurricane was outclassed by enemy fighters which were being encountered in ever increasing numbers, for the Germans had learned the folly of attacking

convoys with unescorted bombers. The Malta convoy battle of August that year was the last major naval action in which Sea Hurricanes participated, although Sea Hurricane IIC's of No. 891 Squadron aboard the escort carrier *Dasher* contributed to the air cover for the amphibious landing in North Africa in November 1942.

At home Sea Hurricanes continued to serve ashore with Nos. 895 and 897 Squadrons at Stretton, and as late as April 1943 No. 877 Squadron was formed with Sea Hurricanes for the defence of Tanga in Tanganyika. The last aircraft to serve afloat were embarked with No. 824 Squadron in H.M.S. *Striker* during October 1943 and served until April 1944 when they were replaced by Grumman Wildcat V's.

## Chapter 12

# WAR IN THE FAR EAST

### The Loss of Singapore

A commentary on the Hurricane's participation in the events which led to the capture of Singapore early in 1942 by the Japanese is bound to be characteristic of the entire campaign. The time-honoured adage—too little, too late—summarises the Allied reaction, albeit enforced, to the swift and devastating onslaught by the Imperial forces of Japan.

Hurricanes did not reach the Malayan peninsula until almost a month had elapsed since the Japanese Army had landed at Kota Bharu. During that time the invaders' onrush had carried them some three hundred miles through the jungle southwards towards Singapore and, by the beginning of January, 1942, were less than one hundred miles from Britain's key port and naval base. Brewster Buffalos of the Royal Air Force and Royal Australian Air Force had hitherto constituted almost the sole fighter defence in the campaign and, despite their being lightened considerably by drastic reductions in armament and fuel, their performance proved desperately inferior to that of the modern Japanese naval Zero-Sen fighters.

Although Hurricanes (a total of fifty-one aircraft and twenty-four newly-trained pilots) had arrived at Singapore on 3rd January 1942, they could not be uncanted and prepared for operations until 19th January. Air Vice-Marshal P. C. Maltby, commanding the air defences, wrote in a despatch, "The feeling spread that (as a result of newly-arrived reinforcements) at last the Japanese were going to be held on the ground . . . whilst it was confidently expected that the Hurricanes would sweep the Japanese from the sky." Apparent justification for this confidence was manifest the following day for, when twenty-seven unescorted enemy bombers attacked the city, the Hurricanes

shot down eight without loss. Swift retribution was dealt on 21st January, however, when bombers again approached the port; this time an escort of Zero fighters set upon the Hurricanes and in turn destroyed five without loss.

It had quickly become evident that while the Hawker fighters possessed marginally superior climb, speed performance and manoeuvrability above 20,000 feet, the Japanese pilots preferred to operate well below that altitude with the result that the Hurricane was quite outclassed. The British aircraft (a mixture of late-series Hurricane Mark I's and early series Mark IIA Series I's) had been scheduled for operation in the Middle East early in 1941 and had been fitted with desert air filters which reduced their maximum speed by some twenty-five miles per hour.

During the first week of operations by the Hurricanes, they were used in constant—but, perforce, far from adequate support for the army struggling to disengage and retire towards the causeway which led to Singapore island. The Japanese landings at Endau had been bitterly contested by a puny force of obsolete Vickers Vildebeest bombers escorted by Hurricanes but, by 28th January, of the fifty-one reinforcement aircraft, which had been available, only twenty now remained. With an average of only ten aircraft serviceable each day and under constant shellfire on their derelict airstrips at Tengah, Sembawang and Seletar, the Hurricane pilots continued the hopeless fight to protect the evacuation of Singapore until, on 10th February, the remnants—seven aircraft—were withdrawn to the doubtful security of Sumatra.

It had already been planned to continue resistance from Sumatra since mid-January 1942, operations being performed principally from two airfields, "P.I.", a fighter base at Palembang and



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"P.II", some twenty miles to the South. Organisation of the available fighters in Sumatra had been achieved by Air Commodore S. F. Vincent in the formation on February 1st of No. 226 (Fighter) Group, consisting of the remaining Buffalos, evacuated from Malaya, and joined by No. 605 Squadron with thirty-three Hurricane Mark IIA's, recently flown in direct from H.M. Carrier *Indomitable*. The pilots of these fresh Hurricanes were newly-trained in the United Kingdom and had yet to see combat; unfortunately five crashed on landing at P.I. It was to this base that the seven survivors of the Singapore defence were flown.

The Japanese commenced their attack on Sumatra on 14th February and the following day a large convoy was attacked by Hudsons and Blenheims escorted by Hurricanes. Great execution was wrought and the threatened invasion was temporarily frustrated. The Hurricanes attacked a force of Japanese Zero fighters on the ground at Banka Island and dealt vengeance for their previous misfortunes. However, as usual, the enemy's reaction was quick and effective with a paratroop attack on P.I. and Palembang. Almost at once it became impossible to continue operations from P.II as well, and orders were given to withdraw the remaining Hurricanes to Java. Such was the haste with which the evacuation was precipitated, unfortunately, that almost all the Hurricanes' spares were abandoned.

By 18th February twenty-five Hurricanes remained, of which eighteen were serviceable and, flown by Nos. 232 and 605 Squadrons, were thrown into the defence of Batavia against tremendous odds. Some slight easing of the pressure might have resulted had not the U.S. Carrier *Langley*, with reinforcing Curtiss P-40 fighters aboard, been sunk by Japanese torpedo-bombers. On 28th February the number of Hurricanes had so diminished that the two squadrons merged under No. 605. The following evening the remaining twelve aircraft carried out a low level attack on a Japanese landing at Eretanwetan, a hundred miles east of Batavia. Armed only with their rifle-calibre machine guns this gallant formation inflicted heavy casualties among enemy troops coming ashore in barges, as well as setting fire to six small sloops and three light tanks. March 2nd saw the Hurricanes withdrawn from their base at Tjililitan to Bandoeng, a flight constantly interrupted by appearances of enemy fighters. While fuel and ammunition lasted the tiny force continued to cover the remaining ground forces as best they could until, on 7th March, only two remained. These, the last Allied fighters in Java,

were destroyed and the surviving pilots and ground-staffs endeavoured to seek transport to Australia.

A campaign (of which no account has ever been published) had been fought by Hurricane pilots of the Dutch Java Air Force during February and March, 1942. After the loss of Singapore twenty-four Hurricane I's were diverted to Tjililitan in Java and handed over to the Dutch under Captain Terluin. One squadron was assigned the defence of Batavia while other aircraft attacked Japanese sea-borne forces at Bantam Bay and Kretan. For the loss of eighteen Hurricanes, the Dutch pilots destroyed 30 enemy aircraft in little over a fortnight. Meanwhile forty crated Hurricane IIA's had arrived at Tandjong Priok (Batavia harbour), but owing to the shortage of R.A.F. pilots twenty-four of these were passed to the Dutch who promptly set about their assembly.

By 27th February the Dutch Hurricane force, consisting of thirty-two Hurricanes, was deployed at Tjililitan, Tasikmalaja and Ngoro. For several days these and a small number of Dutch Buffalos were in constant action against the invading Japanese. On 1st March, however, after a particularly successful foray by the Hurricanes against enemy landing barges at Rembang, the Japanese commenced heavy raids against Tasikmalaja and Ngoro and within two days, despite some losses to the Hurricanes' guns, had destroyed almost the entire Java Air Force.

The resistance throughout the campaign since December 1941 had been hopeless, yet the appearance of Hurricanes had occasionally averted far greater disasters. Those occasions served to demonstrate only too painfully what might have transpired had enough fighters of the Hurricane's calibre been ready to face the Japanese onslaught on that fateful 7th December.

### The Hurricane in Burma

Retreat, recover, conquer. In this order, these actions have been characteristic of so many campaigns fought by British commanders over the past fifty years that one wonders if they are laid down in the War Manual. Undoubtedly this was the pattern forced by circumstances on the Commonwealth forces in Burma in the three-and-a-half-year struggle before the Japanese were driven back and finally defeated.

When the Japanese bombers opened the attack on Burma with their raid on Rangoon on 23rd December 1941, the responsibility for defence of the entire country rested on No. 67 (Fighter) Squadron, equipped with sixteen Brewster Buffalo

fighters, and the American Volunteer Group (the famous "Flying Tigers" commanded by Col. C. L. Chenault, U.S.A.A.F., possessing twenty-one Curtiss P-40 fighters), charged with the defence of the Burma Road in the North.

By the time the land battle commenced in January 1942, it had become evident that the Japanese had available about five hundred combat aircraft with which to support their invasion and that the thirty-seven American fighters could hardly survive more than a token defence against these odds. This was the situation when Air Vice-Marshal D. F. Stevenson became Air Officer Commanding-in-Chief of Bengal Command. At once thirty Hurricanes (mostly late-series Mark I's previously destined for Singapore, but diverted) and a squadron of Blenheims reached No. 221 Group. It had been intended to replace No. 67 Squadron's Buffalos with the Hurricanes immediately but, so pressed were the defences, this could not be achieved until later and the Squadron continued to fly its almost exhausted Buffalos. The Hurricanes, however, were flown into action by 221 Group's pilots late in January in defence of Rangoon, their short range (no auxiliary fuel tanks had yet arrived from Britain) dictating their operation from advanced flying grounds at Mergui, Tavoy and Moulmein. After the fall of Singapore on 15th February, two further squadrons of Hurricanes (with tropicalised Mark IIB's) were also diverted, this time arriving by sea at Ceylon.

By 5th February, Moulmein, the last of the advanced strips, had been captured by the Japanese in their advance on Rangoon and the number of Hurricanes was dwindling fast.

Stevenson wrote "The maximum number of Hurricanes reached in action with the enemy was about 30... this strength, moreover, fell away rapidly and on February 11th, there were 15 serviceable Hurricanes, and on March 5th, only 6."

A further small force of Hurricanes was held for the defence of Magwe, the principal air base in Central Burma, but due to the distance away these aircraft could take no part in the battle further south. Nevertheless the Japanese were unable to achieve air supremacy; indeed, during the first two months of the campaign up to the fall of Rangoon on March 8th 1942, the P-40's of the A.V.G. and the R.A.F. Buffalos and Hurricanes managed to retain air superiority—about a hundred and fifty enemy aircraft were destroyed in air combat, and of these over sixty fell to the Hurricanes' guns.

However, the loss of Rangoon, through whose port flowed the greater part of the army's and air forces' supplies, presaged the end of a fully-organised defence in Burma. The Japanese were careful to permit no large-scale evacuation of the land forces from the port by sea with the result that the army had to retreat northwards along the Irrawaddy and Sittang rivers. Stevenson now withdrew the remains of his fighter force—three Buffalos, four P-40's and about twenty Hurricane I's—to a series of "kutchas" strips, hastily cut in the jungle between Rangoon and Mandalay, and from these maintained air cover over the forty-mile-long army convoy retreating northwards. It was the pilot of one of these Hurricanes who first spotted a Japanese armoured thrust, some seventy miles to the north-east of Rangoon, aimed



*A Hurricane IIB fighter-bomber attacking Japanese positions in Burma.*

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at the flank of this convoy. Operations from the roughly-cut jungle strips took a heavy toll of aircraft—it is recorded that several Hurricanes were by now fitted with bamboo tailskids having lost their tailwheels on the bad surfaces, while another Hurricane was flown in combat fitted with an entire longeron made from bamboo. By 12th March the pilots had fought themselves to exhaustion and No. 67 Squadron flew their old Hurricanes to the island of Akyab, off the west coast of Burma, where, in company with Hudsons of No. 139 (G.R.) Squadron, it was formed into Akwing and re-equipped with tropicalised Hurricane IIA's sent from Ceylon.

Meanwhile at Magwe in Central Burma, No. 17 (Fighter) Squadron was operating the remnants of No. 221 Group's Hurricane IIA's both as escorts to the assortment of bombers still flying and as support for the approaching army in its retreat. Burwing, as this force was called, was to live a short but dramatic existence. On 20th March a Hurricane pilot reported that fifty Japanese aircraft had landed at Mingaladon two hundred miles to the south, and the following day nine Blenheims and ten Hurricanes set out from Magwe to attack the enemy-held base. No fewer than twenty-seven Japanese aircraft were destroyed, nine falling to the guns of the Hurricanes in air combat. This action, however, provoked swift and disastrous retaliation and before Burwing could repeat the attack during the same afternoon, as planned, the Japanese commenced their air assault on Magwe. Almost every aircraft in Bengal Command was concentrated on this airfield when the first waves of enemy bombers arrived. Twelve Hurricanes—all that remained serviceable—took off to intercept and during the following twenty-five hours of almost continuous attack managed to shoot down four of the enemy. But Magwe was virtually destroyed. Only five Hurricanes remained airworthy and these were withdrawn to Akyab. The pilots had been at two minutes readiness from dawn to dusk, day after day for eight weeks. The Merlin engines—some not equipped with tropical filters—were worn out. Yet even at Akyab there was to be no respite; Japanese bombers carried out heavy attacks on March 23rd, 24th and 27th, with the result that the surviving pilots of No. 17 Squadron were ordered to Myitkyina and thence to Jessore for rest and re-equipment with Hurricane IIB's.

The losses incurred at Magwe and Akyab brought to an end the coherent air defence of Central Burma. The remainder of Burwing was withdrawn to China while the army retired past

Mandalay northwestwards into India. The efforts of fewer than forty Hurricanes and a handful of American fighters had been unable to stem the Japanese advance. Servicing of the Hurricanes had been accomplished almost without spares, and the few which were available had been salvaged from crashed aircraft. The air forces had given a magnificent account of themselves, claiming to have destroyed 233 enemy fighters and bombers in the air, 58 destroyed on the ground, probably destroyed 76 and damaged a further 116. Thirty-eight Allied fighters (twenty-two of them Hurricanes) were lost in combat, but most of the pilots were saved.

Now there came a period of relative calm. Hurricanes, as well as many other aircraft, were arriving in mid-1942 in India and Ceylon at the rate of more than fifty machines every month. By June that year, eleven Hurricane squadrons had been formed or re-formed under No. 224 Group. All were being equipped with Hurricane IIA Series 2 or Hurricane IIB fighter-bombers, capable at that time of carrying 250-pound bombs. By the following August stocks of 44-gallon auxiliary fuel tanks had arrived, thus allowing the Hurricane to fly in support of ground forces up to four hundred miles from their bases.

The Hurricane-equipped squadrons in India at this time were No. 17 (moved from Jessore to Alipore in August), No. 30 (at Ratmalana, Ceylon), No. 67 and 79 (at Alipore), No. 135 (at Dum Dum), No. 136 and 146 (at Alipore), No. 258 (at Trincomalee, Ceylon), No. 261 (at Colombo, Ceylon), No. 615 (at Jessore) and No. 681 (formed from the remnants of No. 3 Photographic Reconnaissance Unit at Pandaveswar).

Mention of the Hurricane squadrons based on Ceylon prompts a digression from the campaign in Burma, for it was these units that were so heavily committed during the Japanese excursions around the island early in April 1942. No. 261 and 30 (Fighter) Squadrons had been brought recently from the Middle East aboard H.M. Carrier *Indomitable* to the airfields at Ratmalana and Trincomalee. Thus on 5th April, when the Japanese naval carrier task force launched its attack by about one hundred and fifty naval fighters and bombers against Allied shipping and shore installations at Colombo, the defences could muster fifty serviceable Hurricanes (about half of them new tropicalised Mark IIB's and the remainder desert-weary Mark I's) and a small number of Fleet Air Arm Fulmars. Thirty-six Hurricanes of Nos. 30 and 258 Squadrons and



*Members of Commonwealth forces manhandle a Hurricane IIC at a Repair Depot in North Burma in 1943.*

six Fulmars took off to intercept the Japanese raiders, destroying eighteen for the loss of fifteen Hurricanes and four Fulmars. Four days later seventeen Hurricanes of No. 261 Squadron and six Fulmars intercepted a raid on Trincomalee and the neighbouring airfields at China Bay. Fifteen enemy were destroyed by the fighters for the loss of eight Hurricanes and three Fulmars.

Two factors were to emerge from the operations against the Japanese so far described. It had become evident that Hurricanes—at any rate the Merlin XX-powered Mark II's—had achieved reasonably satisfactory results in combat with Japanese fighters and bombers of the types used in support of the land forces; indeed, the campaign during the retreat in Burma had shown the Hurri-

cane to be superior in many respects to the equipment in use by the Japanese army air force at that time. However, when matched against the Zero-Sen fighters during the attacks on Ceylon, the Hurricanes were shown to be much inferior in performance.

Nevertheless, it was to transpire at a later date that the losses inflicted by the Hurricanes and Fulmars on the Japanese naval aircraft, which constituted the striking arm of Admiral Nagumo's fleet, were to influence the course of the vital battle of the Coral Sea. Three of his five aircraft carriers, which otherwise might have reversed the fortunes of the American fleet, had had to return to Japan in order to replace their lost aircrews and machines.

*Below: Hurricane IIC fighter-bombers on a Burmese airfield.*



## THE HAWKER HURRICANE



*A Hurricane IIC, with guns removed, on a training flight over Bengal.*

The build-up and re-organisation of Allied forces which had started in India during 1942 continued into 1943. The Japanese Army had halted on the threshold to India, lying poised in the jungle to strike towards Calcutta, yet, their lack of superiority induced them to maintain, at least for the time being, little more than a passive threat. To those who had not to endure the endless months of sickness and discomfort in the sticky jungle heat, Burma had become the Forgotten Front.

Japanese bombers attempted sporadic raids on Calcutta during December 1942 and the following month in an attempt to panic the teeming population prior to land assaults but, though some success was achieved in this respect, such was the defence provided by the Hurricane squadrons, the raids were soon abandoned. Two units prominent in these actions were No. 17 and 79 (Fighter) Squadrons, the former operating from Red Road—an improvised strip running parallel with Calcutta's main street, the Chowringhee.

While this defence was being mounted in the north, Wavell's army had embarked on its first campaign in the Arakan, in West Burma. Supported by three Hurricane fighter-bomber

squadrons, Nos. 28, 261 and 615, the offensive was to clear the Japanese out of the Mayu peninsula by thrusting towards the island of Akyab. Setting out from Cox's Bazaar on 9th December 1942, the army reached Indin, one hundred miles down the coast, eighteen days later. Japanese reinforcements, however, then halted the drive, and, despite continuous assistance by the Hurricanes, the army was forced to withdraw from the Mayu peninsula, in May 1943.

By June 1943 Hurricanes equipped sixteen squadrons. Hurricane IIB's and IIC's were used almost exclusively, though a small number of Mark IID's with 40-mm. Vickers anti-tank guns had just arrived in Colombo. No. 11 (F) Squadron, having been moved from the Middle East in October the previous year, was now stationed at Baigachi in East Bengal, with No. 261 Squadron. No. 17 was at Argatala with the reconnaissance Hurricanes of No. 681 and with a detachment from No. 28 (F) Squadron; No. 20 Squadron was stationed at Imphal with another of No. 28's Flights; Nos. 30, 258 and 273 constituted the defence of Ceylon, based at Colombo, China Bay and Ratmalana. At Yelahanka, No. 60 Squadron was already operating, while No. 34 was re-equipping there with Hurricanes, and the advance party of No. 135 Squadron had just arrived from Bihar State. Nos. 67 and 79 operated from Chittagong, Nos. 136 and 615 at Red Road, Calcutta, and No. 146 Squadron at Comilla in East Bengal.

In all, 670 Hurricanes were on charge in India, available for the forthcoming campaigns in Northern Burma. Nearly two hundred of these aircraft were turned over to the slowly-expanding Indian Air Force, the first squadron so equipped—No. 6, I.A.F.—receiving its aircraft in August 1943 at Trichinopoly, Madras State.

By 1944 seven further Indian squadrons and seven R.A.F. had been added, bringing the total to twenty-nine Hurricane squadrons (Nos. 136 and 615 having, in the meantime, been re-equipped with Spitfire VC's) in an air force of about eighty squadrons of all types.

It would be wrong, however, to imply that the Hurricane bore the sole responsibility for tactical support and defence in Eastern India and Burma. It is true that throughout 1943 and early 1944 the great majority of support squadrons were so armed, but the Hurricane was to be joined by squadrons of Spitfire fighters (P.R. aircraft had arrived in October, 1942) and Thunderbolts, aircraft whose performance was superior to those of the enemy. But the Hurricane it was that

performed the lion's share of the close support duties throughout the critical Kohima and Imphal operations and accompanied the army on its advance southwards through Burma, while the Spitfires provided the principal cover for these and many other bombing operations.

The first Chindit expeditions had started out from the Naga hills in Northern Burma during the period of the first Arakan campaign in February, 1943, their object being to penetrate deep into the Japanese-held territory and cause dislocation of supply lines and discomfort in the enemy's rear. To such a depth did the Chindit columns penetrate that they could only be sustained by considerable supply droppings, these being accomplished by squadrons of Dakotas. Only rarely did the Japanese air force attempt to interfere with these sorties—such was the measure of ascendancy gained by the Allied aircraft—but when they did they met strong escorts of Hurricanes awaiting them. The advent of the monsoon in June brought the land operations to an end and the Chindits dispersed to the north and into China, though support sorties continued to be flown in spite of the treacherous weather conditions now prevailing.

In November, 1943, XV Corps set out on its move south from Cox's Bazaar to commence the second campaign in the Arakan, again pushing down the Mayu peninsular and again closely supported by Hurricane fighter-bombers. Yet again the advance was halted, in February 1944, though the withdrawal that followed this time

was one of convenience in that it was now that the Japanese, under General Hanayoa, to the north-east chose to launch their major assault towards Calcutta, and reinforcements could be flown from the Arakan to the threatened areas round Tiddim and Imphal.

Such were the elaborate plans laid by General Hanayoa that had the enemy committed itself to a simple land battle there is little doubt that the Japanese attack would have carried deep into India. The Allies, however, had never forfeited their command of the air—an essential factor apparently overlooked or ignored by the Japanese High Command. Moreover, unlike previous experience in Burma, the enemy found that the Commonwealth army, when heavily engaged, no longer retired, but stood firm and fought back. The 7th Indian Division, which had participated in the second Arakan campaign, had been surrounded at Sinzweya and was holding its ground, sustained by heavy and continuous supply drops under cover of protecting Spitfires and roving Hurricane patrols. By April 1944, the Arakan battle was over and Sinzweya relieved.

The assault in the north east assumed serious proportions when, in March, three Japanese divisions, supported by armour, attacked across the Kabaw valley and severed, at Tiddim, the important supply route to Imphal and Kohima, two bases some forty miles inside Indian territory and of considerable importance in the defence of that country. On 16th March the Japanese 33rd Division, advancing on the Manipur plain, cut



*500-pound bombs being loaded on a Hurricane IIC in the Arakan.*

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the last land entry to the Commonwealth forces in the north and laid siege to Imphal. At this time six Hurricane squadrons were stationed in the immediate area, the Mark IIB's (fighter-bombers) of Nos. 34, 42 and 113 Squadrons, flying from Tuliha and Palel, and the Mark IIC's (fighters) of Nos. 11 and 28 Squadrons, R.A.F., and No. 1 Squadron, I.A.F., from Sapam and Imphal itself. Throughout the following three-month siege, Imphal was reinforced entirely by air while the Hurricanes sought to prevent any concentrated attack on the town. In the words of a despatch from Air Chief Marshal Sir Ralph Pierse, Allied Air Commander-in-Chief, "The enemy's efforts to deploy in the Imphal plain during May 1944, were decisively defeated by Hurricane attacks at short intervals on any concentrations reported by ground troops through our Army Air Support Control operating at a high standard of efficiency."

One of the more specialised duties performed during the campaign was that of tactical reconnaissance, carried out by the Hurricane IIC's of No. 1 Squadron, I.A.F. Fitted with a forward-facing camera, inboard of the starboard cannon, this version was used for low altitude photography, gunnery spotting and message dropping. An example of this good work was provided by Squadron Leader Arjan Singh who, on a late evening patrol, reported the approach of a Japanese battalion moving on Imphal. Fortwith thirty-three Hurricanes took-off in the gathering dusk and presently arrived over the area of the

reported enemy forces. Turning on their landing lights, the leading Hurricane pilots could discern the Japanese column and straightaway attacked with cannon, machine guns and bombs. There were no immediate results visible in this foray, but no assault materialised on Imphal—later it was learnt from captured papers that fourteen Japanese officers and over two hundred other ranks perished that evening.

From the official report on the siege of Imphal come the following extracts: "The tactical reconnaissance Hurricanes searched day by day for enemy movements and positions, delivering attacks as opportunity offered; owing both to the wild and rugged nature of the countryside they had to cover, and to the ingenuity of the enemy in laying traps and in concealing himself, this was a task that called for a high degree of skill in both flying and observation. They spotted for artillery units, took photographs as required, passed information as to the location of our own forces, and dropped messages. They played a large part in the discomfiture of the Japanese investing Kohima" . . . "No less valuable was the work of the ground attack Hurricanes, most versatile of aircraft. They performed an indispensable service in the early period of the Japanese offensive by their persistent attacks upon the forward Japanese lines of communication at a time when the enemy was making every effort to bring up his stores and armament westwards. One squadron in particular came to specialise in what proved very remuner-

*Below: Servicing a Hurricane IID of No. 20 Squadron at Akyab.*





*A Hurricane IV reconnaissance fighter flying low over the Irrawaddy by the Aya Bridge near Mandalay early in 1945.*

ative attacks upon Japanese lorries on moonlit nights. At first the vehicles were easily detected by their headlights, but after two or three evenings they took to moving about without artificial illumination and the Hurricane pilots were thus compelled to seek their prey by selecting such well-known traffic lines as the Ye-U-Kelewa road and searching for lorries as they picked their way in the moonlight. When the perennial Japanese shortage of motor transport is taken into consideration it will be realised how materially these attacks helped to blunt the offensive impetus of the enemy." . . . "Ground attack Hurricanes attacked locomotives and rolling stock . . . constantly searched the Chindwin for enemy rivercraft . . . in May and June a total of at least fifteen enemy tanks were put out of commission by the Hurricanes."

The Hurricanes' ubiquity did not end here. The Mark IID version had also appeared in India in 1943. No. 20 Squadron, so equipped, had fought throughout the second Arakan campaign and the 40-mm. anti-tank guns made short work of the relatively light armour carried by the majority of Japanese fighting vehicles. A detachment from this Squadron had been sent to operate over the Manipur battle area and did great execution among the targets for which the Hurricanes' guns were intended.

Later this remarkable fighter was to be used in a very different role. After the relief of Imphal, when the Fourteenth Army fought its way back

into the terrible Kabaw valley—reputably the most malarial area in the World—Hurricane fighter-bombers, using their smoke-laying equipment, sprayed with D.D.T. the entire length of road through the valley, a precaution which almost eliminated the risk of crippling casualties from malaria. This operation, moreover, was performed at the height of the 1944 monsoon season—a period in which 175 inches of rain fell in Northern Burma and 500 in Assam.

With the launching of the second Chindit Expeditions and the Gurkha thrust towards Myitkyina in May 1944, and the relief of Kohima the following month, the re-conquest of Burma started. Seven of the Hurricane squadrons (Nos. 79, 123, 134, 135, 146, 258 and 261) were now temporarily withdrawn and converted to the more powerful Thunderbolts, while five others (Nos. 67, 136, 273, 607 and 681) had already received Spitfires. Joining the six Hurricane squadrons of Nos. 170 and 243 Wings in No. 221 Group, already mentioned in the defence of Imphal, came No. 60 Squadron of No. 168 Wing, equipped with bomb-carrying Hurricane IV's, stationed at Silchar West in South Assam, and later moved to Kangla in the Imphal valley. Also to take part in the new campaign were No. 20 Squadron, now flying anti-tank and rocket-firing Mark IV's from Chiringa in the Arakan, Nos. 4 and 6 Squadrons of the Indian Air Force with Hurricane IIB's and IIC's at Cox's Bazaar, and No. 9 Squadron, I.A.F., with Hurricane IIC's at Comilla in East Bengal.

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(Indian Hurricane squadrons were also operating elsewhere, in particular performing "watch and ward" duties in the North West Frontier Province.)

The Fourteenth Army's assault in Northern Burma was launched just prior to the onset of the monsoon in 1944, but despite the constant and torrential rains Lord Mountbatten determined to continue the offensive. Across and down the Chindwin river forged the ground forces, though progress was often maintained by airborne landings, as always covered by the tactical squadrons. Tiddim was captured on 19th October, and on 2nd November, following a heavy bombardment by artillery, mortars and four squadrons of Hurricanes, the important position, "Vital Corner", was overrun.

While the Fourteenth Army fought on into Central Burma, XV Corps' progress in the Arakan was gaining momentum. On 2nd January, 1945, two Hurricane pilots of No. 20 Squadron, patrolling low over Akyab, spotted some of the inhabitants signalling that the enemy had evacuated the island. Immediately Allied forces landed and established a base from which the first of a series of "coast-hopping" amphibious assaults was launched. This was made on Myebon, some forty miles to the south-east, after attacks by low-flying Hurricanes and Mitchells, through a smoke screen laid by Hurricanes.

To the east in Central Burma, capture of the Shwebo Plain, fifty miles north of Mandalay, enabled the Hurricane squadrons to occupy airfields at Shwebo, Onbawk and Monya, and so attend to the calls for close support. On 10th January, Nos. 60 and 113 Squadrons' Hurricane bombers attacked a Japanese fortified position at Gangaw, one hundred miles west of Mandalay, destroying five out of six bunkers. Afterwards, the Commander of IV Corps, Lieutenant General Sir Frank Messervy, signalled No. 60 Squadron, "Thank you for your most excellent earthquake. Thanks to your effort the whole of Myaukkon now reported captured with only loss of two infantry wounded."

This was the pattern of operations all the way down the Irrawaddy and Sittang rivers. The great red castle of Fort Dufferin at Mandalay was assaulted after breeches in its enormous earthworks had been blasted by Hurricanes, Thunderbolts and Mitchells, and the same day, 20th March 1945, the city itself fell to XXXIII Corps. The

Hurricanes had operated from jungle strips only eight miles distant, hastily cut by the indefatigable Royal Engineers.

On the Corps' right flank at Myinmo the Japanese had sought to concentrate much of their remaining armour in order to prevent the establishment of a bridgehead over the River Mu. Late one evening, two Hurricane pilots, Flight Lieutenants J. Farquharson and R. J. Ballard, caught sight of what appeared to be a small native building but, after closer examination, was revealed to be a cleverly camouflaged Japanese tank which they promptly destroyed with rockets. Shortly afterwards more tanks were discovered, other Hurricanes joined in the attack and twelve further tanks were destroyed. Later General Stopford, XXXIII Corps Commander signalled "(This action) must fully compensate for long periods of waiting for suitable targets. Destruction of enemy armour of major import in our battle for the bridgehead. Well done."

The advance on Rangoon, three hundred miles to the south, became a race against time for it had been ruled that the supporting forces would have to leave Burma at the end of June. On 3rd May, 1945, the same day that the monsoon broke, the 26th Indian Division, part of a seaborne assault by XV Corps, entered Rangoon. It had been a matter of hours.

During the sweep down the Pegu Road, the Fourteenth Army had forced aside large numbers of Japanese and much bitter fighting was yet to take place before the end of the campaign, and as usual the Hurricanes were there. When, on 14th August 1945, Japan accepted Allied demands for unconditional surrender, preparations had already been under way for some weeks for the invasion of Malaya. It was never carried out.

At the end of the War in South East Asia, three R.A.F. squadrons (Nos. 17, 20 and 28) still flew Hurricanes, though within a month all had been converted on to Spitfires. So the Hurricane had seen the War out; it had been called on to perform an unprecedented variety of duties, by day and by night, in fair weather and in the foulest. It had covered the armies in their retreat and it had helped them forward again. It had started with eight machine guns and it finished with the equivalent of a warship's broadside. From the dusty strip inside Calcutta to the rough surfaces hacked in the dense jungle came this fighter.

Well might its motto be "Ubique".



*Bereft of its drab wartime camouflage LF363, originally completed as a Mark IIC, now exists as the last surviving R.A.F. Hurricane in full flying trim.*

## Chapter 13

# IN MORE PEACEFUL SKIES

While the Hurricane continued to fight with such telling effect in Italy and Burma during the last twelve months of the War, it also came to undertake less spectacular work in Britain and the Middle East. By the end of 1943 the Royal Air Force still held over 3,500 Hurricanes on Charge, of which about 1,000 were stored at Maintenance Units throughout the Middle East and a further 1,200 awaited issue at home. These machines were to uphold to the end the Hurricane's reputation for diversity of purpose, being employed by Meteorological Flights, Combined Operations Training Units, Photo Survey Units, Communications Flights, Sea Search and Rescue Units, and Radar, Searchlight and Gun Calibration Flights. Many, of course, continued to serve with Operational Training Units at home and overseas, and substantial numbers were supplied abroad to serve with the air forces of neutral countries.

### The Meteorological Flights

As the air transport routes to the Far East were opened up towards the end of 1943 the need arose to consolidate the meteorological network throughout the Middle East. Upper air climbs had been performed hitherto largely by Gloster

Gladiators and in August 1943 the first Hurricanes were issued to No. 1413 Flight based at Lydda. Operating with detachments at Rayak, Aqir and Damascus, these were aged tropical Mark I's (among them V4388, V6175, W9155 and Z7003) but the following year, as the weather reporting network extended, other Flights were formed and tropical Hurricane Met. Mark IIC's (usually with guns removed) were issued.

The other Met. Flights included No. 1412 at Khartoum in the Sudan, No. 1414 at Mogadishu and Eastleigh in East Africa and No. 1415 Flight at Habbaniyah in Iraq. Equipped with psychrometer struts their Hurricanes performed their laborious "met. climbs" twice a day, usually reaching heights of about 25,000 feet, but sometimes climbing as high as 35,000 feet—no mean achievement for a tired Hurricane with a tropical filter!

Established with about half a dozen machines in each Unit, the Met. Flights managed to find time and aircraft enough to relieve the monotony by participation in local army training exercises. It was during the course of one of these that W/O Lavallee of No. 1413 Flight, engaged in a low level sweep during March 1944, flew into a



*Among the second line duties on which Hurricanes were called on to perform was provision of air cover for air sea rescue launches.*



*An unarmed Hurricane IIC, MW339, of the Air Despatch Letter Service based at Northolt and used to fly priority despatches to and from the Allied forces in France during 1944.*

flock of storks—not only to the detriment of a stork but to his Hurricane which lost much of the skin off a wing root and suffered quite extensive damage to the wing ribs.

Hurricanes continued this work until after the end of the War and in September 1945 the last machines of Nos. 1413 and 1415 Flights were replaced by Spitfires. The other units were disbanded.

In Britain Hurricanes were also employed on meteorological duties, an example being provided by No. 521 (Meteorological Calibration) Squadron which was based at Langham in Norfolk. From December 1944, equipped with brand new Mark IIC's (without guns), the Squadron continued to perform its vital though laborious twice-daily ascents to 24,000 feet.

In India and the Far East Hurricane-flying Met. Flights continued to operate until late in 1946.

## Ground Equipment Calibration

Since the early days of gun predictors and "sound locators" aircraft had been employed to provide the ground-crews with calibration data, and until half-way through the War this effort had been an extraneous duty of any conveniently-based fighter or bomber unit. Such an expedient had come to be accepted simply because the equipment was of short range capability and the aircraft were seldom absent from the squadrons for more than half an hour or so at a time. Moreover it *did* justify some respectable and officially-sanctioned low flying at times!

Radar was a very different matter due to the ranges involved being considerably greater. Nevertheless in the early days of the A.M.E.S. Type I radar stations, with their "floodlight" coverage, calibration was largely derived during exercises (simply by trial and error).

The growth and development of the control and reporting organisation in this country from mid-1941 onwards emphasised the need for specialist pilots with more than a passing knowledge of the equipment which they were helping to calibrate and therefore several special calibration units were established.

The first specialist unit was No. 116 (Calibration) Squadron; this was formed at Hendon in 1941 with Hurricane I's (among them V7136 and V7192), Oxfords, Lysanders and a Puss Moth or two. At first these aircraft flew calibration sorties for the Observer Corps, guns and searchlights, but gradually as the pilots became acquainted with the detailed requirements of the reporting radar the Type I radar stations were added to the list. In 1943, flying from Croydon, the Hurricanes performed medium and low level runs for Type 7 P.P.I. (rotating "searchlight" coverage) radar. Later still this Squadron carried out much of the calibration flying for the mobile Type 15 radar units with the forces advancing in Europe.

Another Hurricane - equipped calibration squadron was No. 527 which, based on Hornchurch from 1943 onwards, was specifically assigned the task of oversea calibration of Type I radar; one detachment alone satisfied the needs of the installations at Stoke Holy Cross, Orby, Northstead and High Street.

As the long range demands of the radar increased at the end of the War so the Hurricanes disappeared from service and by mid-1945 all had been replaced by twin-engine aircraft.

## Other Duties, 1943-45

Since the hectic days of 1940 Hurricanes, as they

were relieved of their more spectacular duties with operational squadrons, had been re-issued to training units. With their manoeuvrability, pleasant handling qualities and great strength they made ideal fighter trainers and many a Spitfire pilot first encountered the vicissitudes of high speed flight in the cockpit of a Hurricane at one of the Operational Training Units either at home or in North Africa.

A lesser-known training duty undertaken by Hurricanes, however, was that for combined operations. By the time the War had entered its fourth year in the autumn of 1942 the Allied forces had achieved considerable experience in the conduct of combined operations, whether they were amphibious or airborne landings, river crossings or simply land operations supported by air and sea forces. It had been found essential to provide fighter support squadrons which at one moment might be called on to lay smoke screens, the next to deliver rocket attacks and later to perform tactical photography of the battle area.

One or two special duty Flights had been formed to supply the air support for certain operations and it was from one of these, No. 1441 Flight, that No. 516 (Combined Operations) Squadron was formed at Dundonald in Scotland on 28th April 1943. With a small number of Hurricanes this squadron participated in many an assault exercise at Newton Bay, Oban and Inveraray on the rugged island coast of west Scotland, laying smoke screens and making simulated straffing runs over the beaches. By March the following year tactical reconnaissance training sorties were being undertaken with vertical and oblique cameras; in one of the many rehearsals at Troon for the Normandy landings a low-flying Tac R Hurricane IIC (LF534) crashed with fatal results into a landing craft lying offshore. No. 516 was however scheduled to move south shortly afterwards and by D-Day it had converted to Mustangs.

In common with so many other combat aircraft in the evening of their lives, Hurricanes served with many units as advanced trainers, base defence aircraft and for communications. For example No. 267 (Transport) Squadron, based at Helio- polis in April 1942, possessed at least one Hurricane (Z4700) for squadron defence and communications, as did No. 95 Squadron—flying Sunderland flying boats from Freetown, Sierra Leone—until the Hurricane in question (Z4257) collided with a DC-2 on 7th September 1942.

In wartime it is perhaps inevitable that communications flying comes to be regarded as one of the least important undertaken by an operational

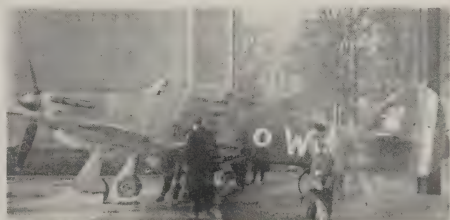
unit and usually implies carrying personnel on leave or posting, or delivering statistical returns to a rear headquarters. Not so the Hurricanes of No. 680 (Photographic Reconnaissance) Squadron.

This Squadron, flying P.R. Spitfires and Lightnings, maintained flights all over the Middle East from 1943 onwards. At first it performed *ad hoc* photography of a particular battle area at the request of the participating forces but later, as the German armies were forced back through Italy and became committed in the Balkans and Dodecanese Islands, the Squadron embarked on a systematic survey which included much of southern Europe. The Hurricanes—many of them P.R. Mark II's themselves—were used to carry photos back from the forward landing grounds to the rear bases of R.A.F. Middle East Command and Headquarters Mediterranean Air Command. It says much for the reliability of the Hurricane, not to mention the skill of pilots and groundcrew alike, to record that between September 1943 and October 1944 (the period of Hurricane establishment on the Squadron) the dozen or so communications Hurricanes flew over a million miles throughout the Middle East without a single accident or loss of one aerial photo entrusted to their care.

### The End of the War—Hurricanes for Export

The end of the War in Europe found the Hurricane almost entirely relegated to second or third line duties in the Royal Air Force. No. 6 Squadron, relieved of its responsibilities in Italy and the Balkans, moved with its Hurricane IV's to Palestine where it remained until October 1946 thus being the last Hurricane squadron in the R.A.F.

Hurricanes also continued to serve the Indian Air Force, remaining with operational units in the



*The only known picture of a French Naval Hurricane, taken shortly after the War near the Arc de Triomphe. It is likely that this aircraft was appropriated by French forces in North Africa long after the tide of war had receded.*

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*Hurricane I's and II's of the Irish Air Corps at Baldonnel; a photo taken in about 1945.*

North West Frontier Province and with training units in southern India until 1946. At least one Hurricane (believed to be a Canadian-built Mark XII) remained airworthy in 1953.

The Irish Air Corps acquired a number of Hurricanes during the War years. First, a Canadian-built Mark I, P5176, force landed in Eire early in 1942 and was bought by the Irish government, being re-numbered 93. Two other Mark I's followed in exactly the same way, becoming 94 (ex-Z2832) and 95. In July 1943 these last two were returned to the R.A.F. in exchange for three earlier production Mark I's (103, 104 and 105 ex-V7540). These and a fourth machine, 106 (ex-Z4037) were delivered to Baldonnel from R.A.F. Station, Newtownards, Northern Ireland. From then until the end of the War, deliveries continued spasmodically, in all seven more Mark I's and six Mark IIC's\* being flown from Newtownards and Long Kesh. Some of them remained in service until 1947.

Middle East countries had also benefited by the supply of British fighter aircraft during the War and the remnants of the fourteen Hurricane IIB's

and IIC's supplied to Turkey in 1942 still served alongside the Spitfires and Focke-Wulf Fw 190's of that country's Air Force in 1945. In the Royal Egyptian Air Force aged Hurricane I's continued



*Upper photo: A Portuguese Hurricane IIC at Langley before delivery in 1945. Lower photo: A night fighter Mark IIC of the Defence of Lisbon Squadron in 1948.*

\* Mark I's: 107 (ex-P2968), 108 (ex-P3416), 109 (ex-V7173), 110 (ex-Z7158), 111, 112 and 114. (113 was not allocated) Mark IIC's: 115, 116 (ex-LF541), 117 (crashed, July 1947), 118 (ex-LF624), 119, 120 (ex-PZ796).

to fly with No. 1 (FR) Squadron and Mark IIC's with No. 2 (Fighter) Squadron at Almaza. A small number of tropical Hurricane IIB's and IIC's which once served with Nos. 1, 3, 7, 40 and 41 Squadrons of the South African Air Force in the Middle East now, at the end of the War, returned to South Africa where they survived only a few months before being written off charge as redundant. One or two remain to this day as museum exhibits.

With the end of the War came a return to Hawkers' traditional quest for overseas markets. The first customer was Portugal and the sale of Hurricanes to that country was largely the outcome of Government-to-Government negotiations in 1943. Under these it was agreed that in return for the use of military and naval bases in the Azores (a concession arising out of a 600-year-old pact between Edward III of England and Ferdinand of Portugal) Britain would supply the equipment needs of Portugal's armed forces. From the stocks of late-series tropical Hurricane Mark IIC's remaining at Maintenance Units and O.T.U.'s the Air Ministry released some fifty aircraft; about forty of these were re-conditioned by Hawker Aircraft Limited at Langley and delivered to Portela de Sacavem, Lisbon, during 1945-46 and the remainder were dismantled and supplied as spares. Until 1951 these Hurricanes served at Aerial Base No. 3, Tancos, and with the Defence of Lisbon Fighter Squadron as both day and night fighters.

Persia was the only other country to which Hurricanes were sold after the War and the order for sixteen single-seaters completed an order for eighteen aircraft placed in 1939, of which only two had been delivered on commercial contract. (A further ten Hurricanes had been transferred to the Persian Air Force during the War; it is believed that these had formed the equipment of No. 74 (Fighter) Squadron during its short stay in Persia, but were left behind on the Squadron's receipt of Spitfires.)

The Hurricanes now sold to the Persian Government were Mark IIC's and, like the Portuguese, were ex-R.A.F. machines originally destined for service with the Middle East air forces. The cannon armament was dispensed with and stub fairings substituted, and as fighter-trainers the aircraft were delivered to the Advanced Group of the Persian F.T.S. at Doshan Teppah.

One other Hurricane was delivered to Persia after the War. This was a two-seat trainer conversion (2-31, ex-KZ232), the work on which was undertaken principally from drawings prepared in



*Top: A Persian Hurricane IIC single-seat fighter trainer. The original contract for these aircraft was negotiated before the war. Centre: The two-seat Persian Hurricane IIC trainer with draughty rear cockpit. Bottom: The two-seater with an adapted Tempest sliding hood on the rear cockpit.*

1940 on a similar project for the R.A.F. (but abandoned before it could be flown). The second pilot's position was incorporated immediately aft of the existing cockpit without extensive modification to the primary structure, the top fuselage stringers being terminated about four feet further aft and additional cross members being inserted between the longerons. The aircraft, which was otherwise akin to a tropical Mark IIC, was first flown by Bill Humble on 27th September 1946 from Langley. At first both front and rear cockpits were left uncovered, the former retaining the usual windscreen and quarterlight frame, and a transparent fairing between the cockpits shielding the latter. It soon became apparent however that the rear occupant suffered considerable discomfort in

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a very draughty cockpit from the airflow turbulence caused by the various screens and fairings in front. Therefore additional stringers were introduced, a fairing added aft of the rear cockpit together with a sliding hood (adapted from that of a Tempest) with windscreen. In this form the Hurricane two-seater was delivered to Doshan Teppeh in 1947, possessing a maximum speed of 320 m.p.h. at 21,500 feet and an all-up weight of 8,140 lb.

### The Last Hurricanes

While a few Hurricanes have survived the years either as open air monuments in tribute to the tradition of the Battle of Britain or as museum relics of one of the most famous of all warplanes, two other machines remain in flying trim to this day. Both can lay claim to the title of the Last Hurricane for one was the last ever held on R.A.F. Charge and the other the last to be built.

LF363, a Mark IIC, was completed at Langley and delivered to the Royal Air Force in January 1944. The following month it was issued to No. 309 (Of Province Ziemia Czerwieska) Squadron of the Free Polish Air Force, serving as aircraft "F-Fox". In 1945 it went to No. 41 Operational Training Unit where it remained while many of its fellow machines were earmarked for export to Portugal. In 1950 it was on charge at Waterbeach Station Flight being maintained in flying condition (by use of spare parts taken from an old Mark II, Z3682) and flown at the many annual Battle of Britain commemorative displays. It was, however, undoubtedly best known as the leader of the annual fly-past over London on Battle of Britain Sunday; for what Londoner seeing that lone Hurricane droning overhead can fail to recall the vivid memories of years ago when fine white trails high in a summer sky marked the efforts of a few young men to save their capital from the ravages of war.

PZ865 was rather different. This was the last Hurricane ever built and was never issued to the R.A.F., being bought by Hawker Aircraft Ltd. off the final M.A.P. production contract. Appropriately named and emblazoned "The Last of the Many!" PZ865 was completed in August 1944 and was "guest of honour" at a ceremony at Langley to mark the completion of this the last of over fourteen thousand Hurricanes to be built. In company with the vintage Hawker Hart biplane (which, it may be remembered, had in 1930 set in train a philosophy that was to foster the Hurricane requirement) and the mightier Tempest fighter, PZ865 was displayed in memorable fashion by "George" Bulman who had, some ten years earlier, accompanied the Hurricane prototype through its all-important first flights.

After peace had returned PZ865 was placed on the civil register as G-AMAU; the guns were removed and it was painted in royal blue and gold. In 1950 it appeared at the Royal Aeronautical Society Garden Party and, shortly afterwards, entered by H.R.H. Princess Margaret achieved second place in the King's Cup Race. Two months later, in August that year, it came third at 295 miles per hour in the Kemsley Trophy Race at Fairwood Common. In 1951 it again appeared at the R.Ae.S. Garden Party and in the National Air Races. That year two films—"Hawks in the Sun" and "Angels One Five"—featured Hurricanes and G-AMAU, LF363 and some of the Portuguese Hurricanes were collected together and painted in semi-authentic colours to represent Battle of Britain machines. Its brief film career over, G-AMAU was once more entered for an air race, this time for the *Daily Express* Challenge Trophy.

And so it went on—a Vintage Rally in 1952, Garden Party in 1953, National Air Races (flown by Don Lucey) in 1954, R.A.E. Jubilee Display (with Bill Bedford) in 1955 and so on. In 1960 it was decided to restore G-AMAU to its original

*Below: Generations apart. The last Hurricane built, PZ865 a Mark IIC, on its completion at Langley in September 1944, seen here with the last existing Hart, G-ABMR. This was the type that originally set in motion the events which led to the F.7/30 and other fighter requirements—and the Hurricane.*



camouflage scheme and today it must be one of the few aircraft to possess both military and civil registration simultaneously. Nor is it wasting time waiting for the next round of Battle of Britain displays. Apart from being a most convenient taxi aircraft for use by the Hawker pilots, it was used as a "chase plane" during target towing trials on the Sea Fury for the Germans during 1959-60. Latest chapter in the Last Hurricane's career was written when, because of its speed range, it was chosen to fly as chase plane during transition trials of the Hawker P.1127 vertical take-off aircraft.

### Epilogue

Thus the life of the Hurricane is nearing its end. Like a great soldier it had its day and it carved its name in History. Perhaps the esteem in which it was held those twenty years ago was due to something characteristic of the British at the time. It was developed in parallel with Germany's Messerschmitt Bf 109 and the Spitfire, and when it came to the test it was not found wanting. True, like most aeroplanes, it had its critics and this book cannot possibly resolve that evergreen argument—which was the better, Hurricane or Spitfire?

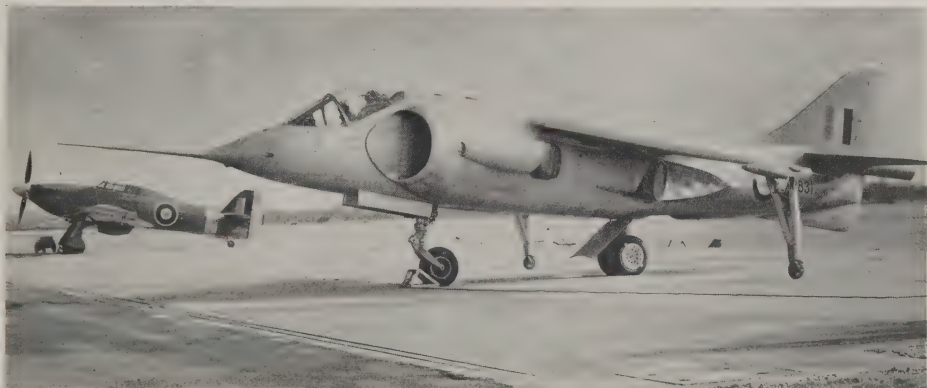
Yet for all the arguments put forward, History must record the fact that it was the Hurricanes and their pilots that were called upon to bear the brunt of the German onslaughts throughout Europe in that first fateful year of the War. That the Hurricane continued to fight Britain's enemies until victory came in 1945 must be the final and telling testimony to a great aeroplane's fighting ability.



Z3687, an early Hurricane II, seen here at Farnborough in 1948, was used by the R.A.E. for tests on an Armstrong Whitworth laminar-flow wing of reduced thickness/chord ratio.



After the War the last Hurricane, PZ865, was registered by Hawker Aircraft Ltd. as G-AMAU and, entered by H.R.H. Princess Margaret, was flown in a number of National Air Races by Group Captain Townsend.



Generations apart. Back in its original colours the last Hurricane was used as a "chase plane" during transition trials of the first prototype Hawker P.1127 vertical take-off aircraft, XP831.

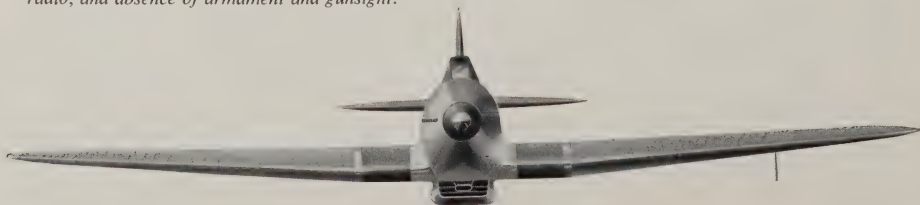


## THE HAWKER F.36/34 HURRICANE PROTOTYPE

*1,025-h.p. Rolls-Royce Merlin "C"  
driving 2-blade Watts fixed-pitch wooden  
propeller.*



*General arrangement of the Hurricane prototype, K5083, as it appeared shortly after its first flight in November 1935. Note the braced tailplane, retractable tail-wheel, early divergent-convergent radiator duct, single canopy frame, absence of radio, and absence of armament and gunsight.*



## LEADING PARTICULARS, GEOMETRIC DATA AND PERFORMANCE

### THE HAWKER F.36/34 HURRICANE PROTO-TYPE

The following leading particulars refer to *K5083* at the time of its evaluation by the Aircraft & Armament Experimental Establishment, Martlesham Heath, in February 1936.

**Powerplant.** Rolls-Royce Merlin C, No. 19. Engine develops 1,025 b.h.p. at 3,000 r.p.m. at 11,000 feet at +6 lb./sq. in. boost, and 905 b.h.p. at 2,400 r.p.m. at 9,800 feet. Propeller: Watts two-blade right-hand wooden Type Z33. Diameter, 11 ft. 6 in. Weight, 96.5 lb. *Note.* Other Merlin C's were also fitted in *K5083*, but were rated differently.

**Geometric Data.** Wing span, 40 ft. 0 in. Overall length, 31 ft. 6 in. Maximum height (propeller vertical), 13 ft. 6 in.

**Loadings.** Wing loading at Aircraft Normal Loaded Weight (5,672 lb.), 22 lb./sq. ft. Power loading (take-off at 5,672 lb.), 5.5 lb./b.h.p.

**Weights.** Aircraft Tare Weight (with 18 gallons of coolant), 4,129 lb. Pilot and parachute, 200 lb. Armament ballast, 400 lb. Instruments, 52 lb. Fuel (107.5 gallons at 7.7 lb./gallon), 828 lb. Oil (7.0 gallons at 9 lb./gallon), 63 lb. *Aircraft Normal Loaded Weight*, 5,672 lb.

**Performance.** (See graphs on Page 143 for maximum speed and climb performance.)

a. *Stalling Speeds* (sea level)

Wheels and flaps up: 70 m.p.h. I.A.S.

Wheels and flaps down: 57 m.p.h. I.A.S.

b. *Airfield Performance* (Grass surface)

Take-off ground run, 265 yards; time, 11½ seconds.

Distance to 50 feet, 430 yards.

Landing ground run, using flaps and brakes, 220 yards.

Distance from 50 feet, using flaps and brakes, 475 yards.

### THE HAWKER HURRICANE MARK I

The following leading particulars refer to production Hurricane Mark I's fitted with either fabric- or metal-covered wings, and with Watts, Rotol or de Havilland propellers.

**Powerplant.** (Early aircraft) Rolls-Royce Merlin II. Engine develops 1,030 b.h.p. at 3,000 r.p.m. at 16,250 feet at +6½ lb./sq. in. boost, and 990 b.h.p. at 2,600 r.p.m. at 12,250 feet at +6½ lb./sq. in. boost. Propeller: Watts two-blade right-hand wooden Type Z38. Diameter, 11 ft. 3 in. Weight, 79 lb.

(Late aircraft) Rolls-Royce Merlin III. Engine develops 1,029 b.h.p. at 3,000 r.p.m. at 16,250 feet at +6½ lb./sq. in. boost, and 971 b.h.p. at 12,250 feet at +5.9 lb./sq. in. boost. Propeller: Rotol three-blade constant-speed right-hand Type R.M.S.7. Pitch range, 35° Diameter, 10 ft. 9 in. Also fitted with de Havilland two-position propeller.

**Geometric Data.** Wing span, 40 ft. 0 in. Overall length, 31 ft. 4 in. Maximum height (Watts propeller, blades vertical), 13 ft. 2 in. (Rotol propeller, one blade vertical), 12 ft. 11½ in.

**Wing.** Root chord, 8 ft. 1 in. Tip chord, 3 ft. 11¼ in. Gross wing area, 258.0 sq. ft. Aspect ratio, 6.2. Wing incidence, +2°. Dihedral, 3.5° on Datum. Sweepback, 3° on front spar. Ailerons: Span, 7 ft. 9 in. Root chord, 1 ft. 7¼ in. Tip chord, 10½ in. Area (both), 19.64 sq. ft. Movement, 22° up, 21° down. Landing flaps: Centresection span (each), 4 ft. 6¾ in. Outboard section span (each), 6 ft. 4 in. Chord (constant), 1 ft. 2¾ in. Total area, 25.11 sq. ft. Movement, 80° down.

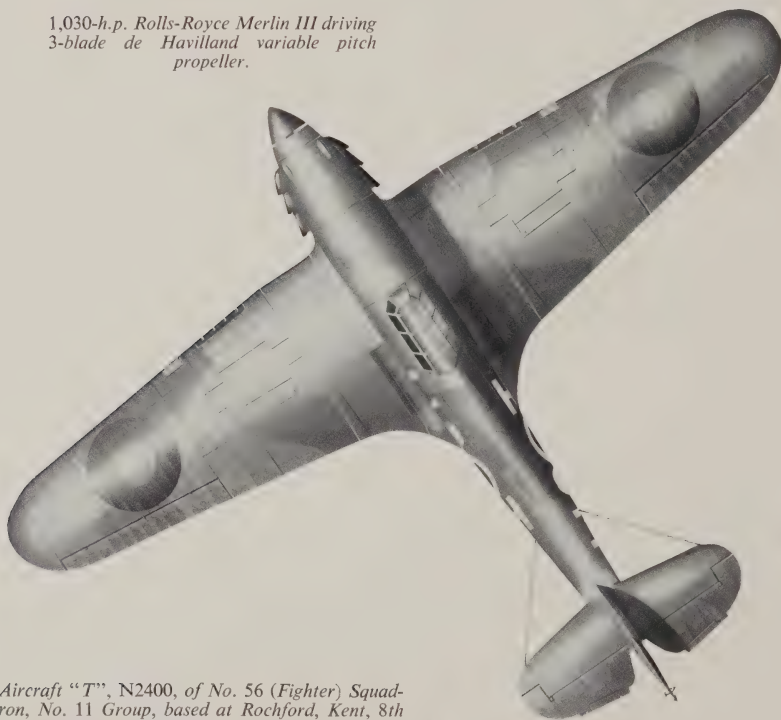
**Tail.** Tailplane: Span, 11 ft. 0 in. Chord, 4 ft. 2 in. Area, 19.6 sq. ft. Incidence, 1.5°.

Elevators (including tabs): Span, 11 ft. 0 in.

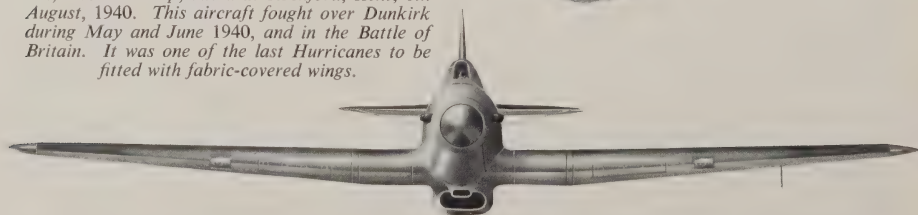


## THE HAWKER HURRICANE MARK I

1,030-h.p. Rolls-Royce Merlin III driving  
3-blade de Havilland variable pitch  
propeller.

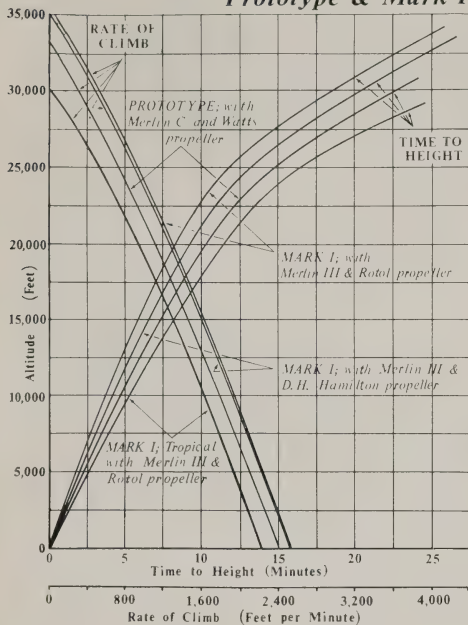


*Aircraft "T", N2400, of No. 56 (Fighter) Squadron, No. 11 Group, based at Rochford, Kent, 8th August, 1940. This aircraft fought over Dunkirk during May and June 1940, and in the Battle of Britain. It was one of the last Hurricanes to be fitted with fabric-covered wings.*



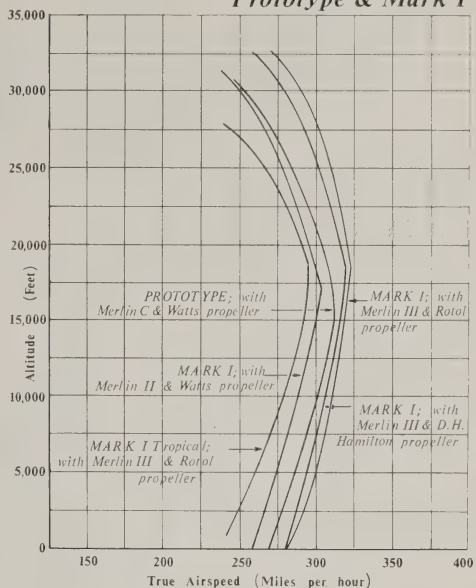
## Climb Performance

### Prototype & Mark I



## Maximum Speeds

### Prototype & Mark I



Area, 13.65 sq. ft. Movement, 28.5° up, 25.5° down. Elevator tab range, 23° up and down.

Fin and rudder: Fin height, 3 ft. 1 7/8 in. Max. fin chord, 3 ft. 7 in. Fin area, 8.82 sq. ft. Rudder height (early aircraft), 5 ft. 11 1/4 in. (modified aircraft), 5 ft. 5 3/8 in. Max. rudder chord, 2 ft. 3 3/8 in. Rudder area (early aircraft), 12.68 sq. ft. (modified aircraft), 13.06 sq. ft. Rudder movement, 28° left and right.

**Undercarriage.** Inwards retracting mainwheels and fixed tailwheel. Track, 7 ft. 7 in. Mainwheels, 800 mm. x 10 inch, on Vickers oleo pneumatic legs with Dunlop pneumatic brakes. Ground angle, 10° 19'. Airscrew ground clearance (static, thrust line horizontal), 11 in.

**Loadings.** Wing loading at Aircraft Normal Loaded Weight (6,218 lb.), 24.1 lb./sq. ft. Power loading (take-off at 6,218 lb.), 6.0 lb./b.h.p.

**Datum point.** 21.2 inches below thrust line and 28 inches forward of the wing leading edge extended to centreline.

**Centre of Gravity.** C.G. at Normal Loaded Weight, 57.3 inches aft of Datum point. C.G. limits, 54.9–58.7 inches aft of Datum point.

**Structure.** Fuselage. Braced structure of steel tubular longerons with steel and duralumin cross tubes; fishplate joints with bolts and tubular rivets; spruce stringers. Metal sheet-covered front fuselage and cockpit, fabric-covered rear fuselage.

**Wings.** (Late aircraft) Centresection of two high tensile steel spars, braced as Warren truss with girders and diagonal tubes. Outer wings: two tapered dumb-bell spars, braced as Warren truss and metal covered. Early aircraft had fabric-covered wings. Ailerons (all production machines) were fabric-covered.

## Weights

a. *Merlin II Version.* Aircraft Tare Weight (with 18 gallons of coolant), 4,743 lb. Pilot and parachute, 200 lb. 8 Browning guns and accessories, 212 lb. Case and link chutes, 9 lb. Ammunition and boxes (2,660 rounds), 202 lb. Instruments and gunsight, 79.5 lb. G.45 camera, 9 lb. Pyrotechnics, 48.5 lb. Oxygen equipment, 15 lb. First Aid, 3 lb. Radio, 57 lb. Fuel (7.7 gallons at 9 lb./gallon), 577 lb. Oil (7.0 gallons at 9 lb./gallon), 63 lb. *Aircraft Normal Loaded Weight*, 6,218 lb.

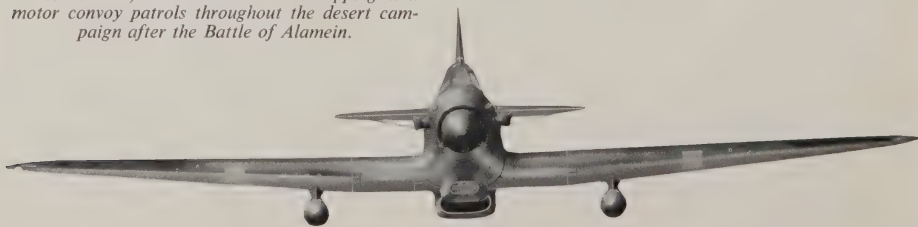


## THE HAWKER HURRICANE MARK IIB

1,260-h.p. Rolls-Royce Merlin XX  
driving 3-blade Rotol constant-speed  
propeller.

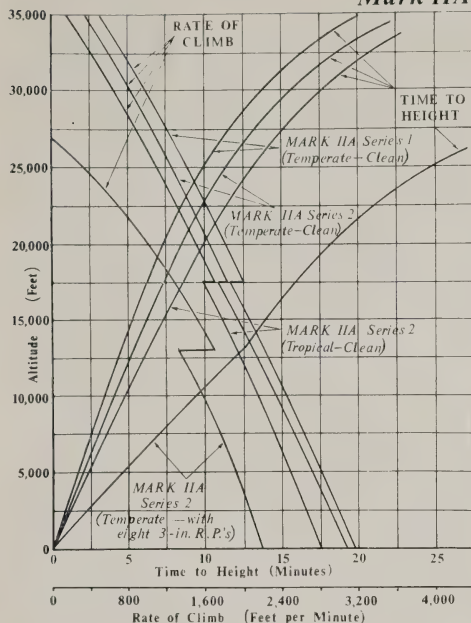


*Aircraft "W", HL599, of No. 335 (Hellenic) Squadron, No. 219 Group, Air Defences, Eastern Mediterranean, mid-1943. Tropically-equipped Hurricane IIB's such as this (shown carrying 250-lb. bombs) were used on anti-shipping and motor convoy patrols throughout the desert campaign after the Battle of Alamein.*



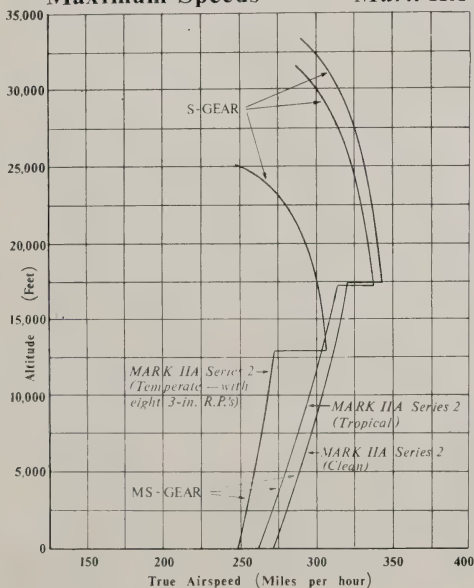
# Climb Performance

Mark IIA



# Maximum Speeds

Mark IIA



- b. *Merlin III Version.* Aircraft Tare Weight (with 18 gallons of coolant), 4,982 lb. with Rotol propeller; 5,034 lb. with D.H. 2-position propeller. Equipment and fuel as (a) above. Aircraft Normal Loaded Weight, 6,447 lb. with Rotol propeller; 6,499 lb. with D.H. 2-position propeller.
- c. *Mark I Overload.* (Tropical aircraft, Rotol propeller, two 44-gallon fixed ferry tanks and full ammunition). Aircraft Overload Weight, 7,490 lb.
- d. *Sea Hurricanes.* Normal Loaded Weights. Mk. IA, 6,589 lb. Mk. IB, 7,410 lb. Mk. IC, 7,605 lb. Tropical Mk. IC, 8,210 lb.

## Performance (see graphs for Maximum Speeds and Climb Performance).

- a. *Range* (aircraft flying at optimum range speed, 190 m.p.h. T.A.S., mean flying weight, 5,830 lb., mean I.C.A.N. altitude, 15,000 feet.)  
Mk. I (Merlin II with wooden propeller), 525 statute miles maximum or 440 miles with 20 minute reserve.  
Mk. I (Merlin III with Rotol propeller), 505 statute miles maximum or 425 miles with 20 minute reserve.  
Mk. I (tropical, Merlin III with Rotol propeller), 460 statute miles maximum or 380 miles with 20 minute reserve.  
Mk. I (tropical, Merlin III with Rotol propeller and two 44-gallon ferry tanks), 935 statute miles maximum or 860 miles with 20 minute reserve.
- b. *Stalling Speeds* (sea level)  
Clean aircraft, wheels and flaps up: 72-80 m.p.h. I.A.S.  
Clean aircraft, wheels and flaps down: 60-75 m.p.h. I.A.S.
- c. *Aerobatics.* The following are the recommended minimum speeds,  
270 m.p.h. I.A.S., for a loop,  
210 m.p.h. I.A.S., for a roll,  
290 m.p.h. I.A.S., for a half roll off a loop and 300 m.p.h. I.A.S., for an upward roll.
- d. *Service Ceiling*  
Mark I with Merlin II and wooden propeller, 33,400 feet.  
Mark I with Merlin III and Rotol propeller, 34,200 feet.  
Mark I (tropical) with Merlin III and Rotol propeller, 32,100 feet.
- e. *Airfield Performance.* (Grass surface)  
Take-off ground run (wooden propeller), 370 yards.  
Distance to 50 ft. (wooden propeller), 580 yards.  
Take-off ground run (Rotol propeller), 350 yards.



## THE HAWKER HURRICANE MARK IIC

1,260-h.p. Rolls-Royce Merlin XX

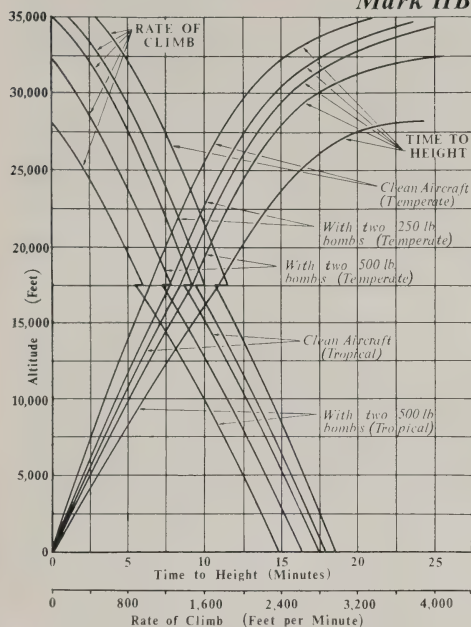


BE150 B-Baker of No. 1 (Fighter) Squadron, was based at Tangmere during 1941-42. It was engaged in Turbinlite patrols with Havocs, and was later one of the aircraft which attacked the destroyer screen of the escaping Scharnhorst and Gneisenau. In 1942 BE150 was repainted in Daylight Operations (Northern Europe) Camouflage and flown against targets in Northern France. It is shown here in these colours.



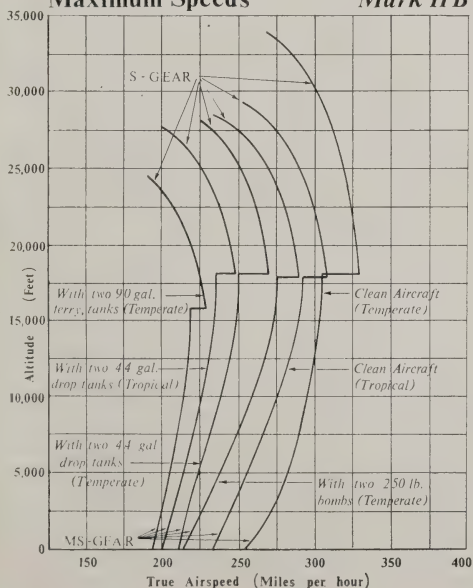
# Climb Performance

Mark IIB



# Maximum Speeds

Mark IIB



Distance to 50 ft. (Rotol propeller), 540 yards.  
Landing ground run using brakes (either propeller), 205 yards.  
Distance from 50 ft. using brakes (either propeller), 420 yards.

## THE HAWKER HURRICANE MARK II

The following leading particulars refer to the Hurricane Marks IIA Series 2, IIB, IIC, IID and, unless stated to the contrary, the Hurricane IIA Series 1 and the Sea Hurricane Mark IIC (or "hooked Hurricane II").

**Powerplant.** Rolls-Royce Merlin XX. Engine develops 1,260 b.h.p. at 3,000 r.p.m. at 11,750 feet in MS gear, and 1,160 b.h.p. at 3,000 r.p.m. at 20,750 feet in S-gear. Sea level take-off power, 1,300 b.h.p. at 3,000 r.p.m. Propeller: Either three-blade Rotol R.S.5/2 with Schwartz blades or Rotol R.S.5/3 with Jablo blades. Gear ratio, 0.42. Airscrew diameter, 11 ft. 3 in.

**Geometric Data.** Wing span, 40 ft. 0 in. Overall length, 32 ft. 2½ in. Maximum height (one airscrew blade vertical, tailwheel on ground), 13 ft. 1 in.

**Wing.** Root chord, 8 ft. 0½ in. Tip chord, 3 ft. 11½ in. Gross wing area, 257.6 sq. ft. Aspect ratio, 6.2. Wing incidence, +2°. Dihedral, 3.5° on datum. Sweepback, 3° on front spar.

**Ailerons:** Span, 7 ft. 8¾ in. Root chord, 1 ft. 7¼ in. Tip chord, 10½ in. Area (each), 9.8 sq. ft. Movement, 22° up, 21° down. Landing flaps: Centresection span (each), 4 ft. 6¾ in. Outboard section span (each), 6 ft. 4 in. Chord (constant), 1 ft. 2¾ in. Total area, 25.11 sq. ft. Movement, 80° down.

**Tail.** Tailplane: Span, 11 ft. 0 in. Chord, 4 ft. 2½ in. Area, 19.8 sq. ft. Incidence, 1.5°.

**Elevators** (including tabs): Span, 11 ft. 0 in. Area, 13.65 sq. ft. Movement, 28.5° up, 25.5° down. Elevator tab range, 23° up and down.

**Fin and Rudder:** Fin height, 3 ft. 2¾ in. Max. fin chord, 3 ft. 6¾ in. Fin area, 8.79 sq. ft. Rudder height, 6 ft. 5½ in. Max. rudder chord, 2 ft. 3¾ in. Rudder area, 13.05 sq. ft. Rudder movement, 28° left and right.

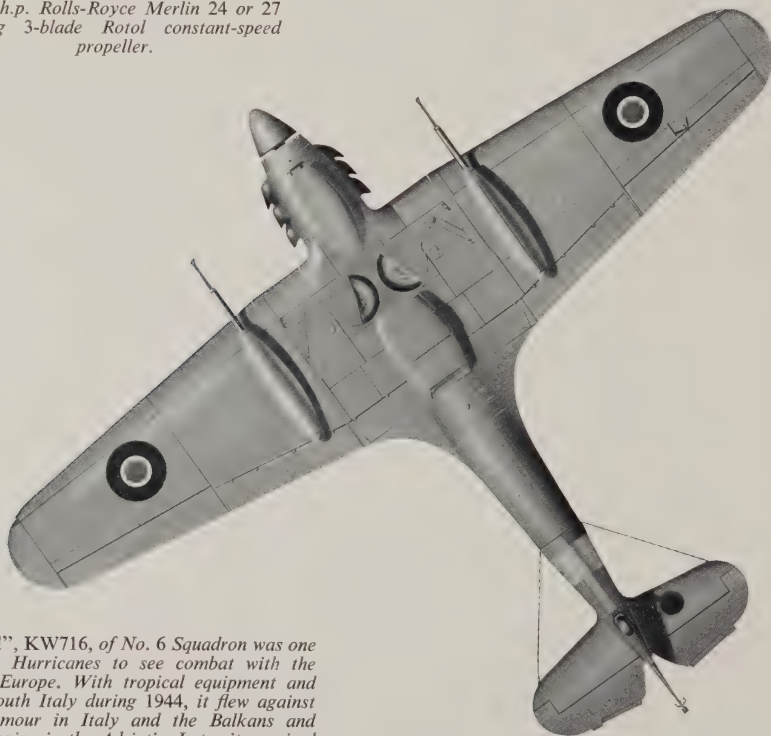
**Undercarriage.** Track, 7 ft. 10 in. Ground angle, 10° 19'. Airscrew ground clearance (thrust line horizontal), 11 in. Wing loading at 7,200 lb., 28.0 lb./sq. ft.

**Datum Point.** 21.6 inches below thrust line and 30 inches forward of wing leading edge extended to centreline.



## THE HAWKER HURRICANE MARK IV

1,280-h.p. Rolls-Royce Merlin 24 or 27  
driving 3-blade Rotol constant-speed  
propeller.

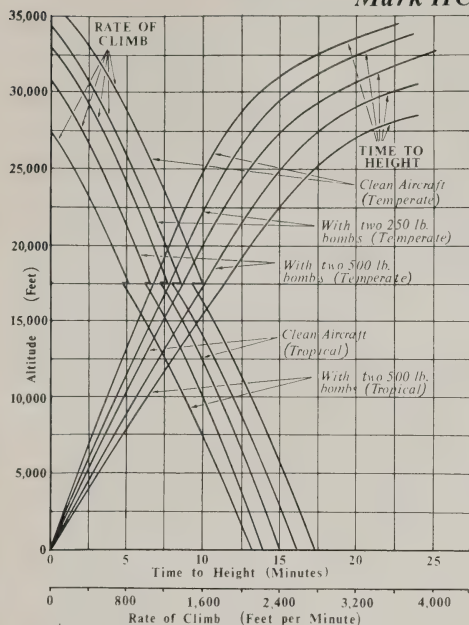


*Aircraft "A", KW716, of No. 6 Squadron was one of the last Hurricanes to see combat with the R.A.F. in Europe. With tropical equipment and based in South Italy during 1944, it flew against German armour in Italy and the Balkans and against shipping in the Adriatic. Later it acquired rocket projectiles in place of the anti-tank guns shown here.*



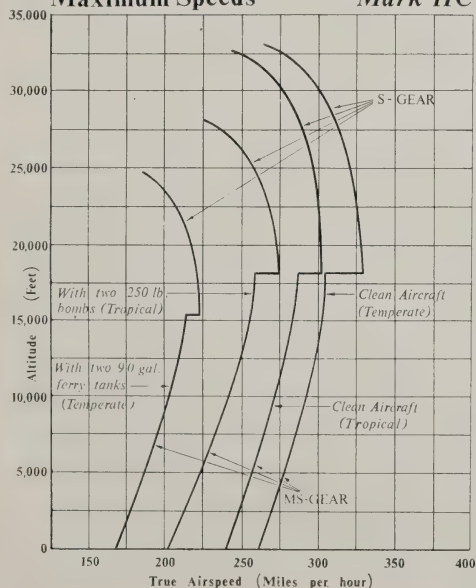
# Climb Performance

Mark IIC



# Maximum Speeds

Mark IIC



**Centre of Gravity.** C.G. at Tare Weight, 9.9 inches above and 55.8 inches aft of Datum Point. C.G. at Normal Loaded Weight, 9.45 inches above and 59.5 inches aft of Datum Point. C.G. limits: 57–60 inches aft of Datum Point.

## Weights

- a. **Mark IIB (Temperate)**—Measured on aircraft Z3067 (14/3/41). Aircraft Tare Weight (with 18 gallons of coolant), 5,467 lb. Pilot and Parachute, 200 lb. 12 Browning guns and accessories, 318 lb. Case and link chutes, 14 lb. Ammunition and boxes (3,990 rounds), 302 lb. Gunsight, 17 lb. G.45 camera, 9 lb. Pyrotechnics, 18 lb. Oxygen equipment, 15 lb. First Aid, 3 lb. T.R.1133 radio, 79 lb. R.3002 radio, 24 lb. Fuel (main, 69 gallons), 497 lb. Fuel (reserve, 28 gallons), 202 lb. Oil (7.5 gallons), 68 lb. *Aircraft Normal Loaded Weight*, 7,233 lb.
- b. **Mark IIB (Tropical)**—Measured on aircraft V7480 (23/1/41). Aircraft Tare Weight (with 18 gallons of coolant), 5,594 lb. Pilot and Parachute, 200 lb. 12 Browning guns and accessories, 295 lb. Case and link chutes, 14 lb. Ammunition and boxes (3,990 rounds), 302 lb. Gunsight, 18 lb. G.45 camera, 9 lb. Pyrotechnics, 26 lb. Oxygen equipment, 15 lb. First Aid, 3 lb. Desert equipment, 50 lb. T.R.1133 radio, 79 lb. R.3002 radio, 24 lb. Fuel (main, 69 gallons), 497 lb. Fuel (reserve, 28 gallons), 202 lb. Oil (7.5 gallons), 68 lb. *Aircraft Normal Loaded Weight*, 7,396 lb.

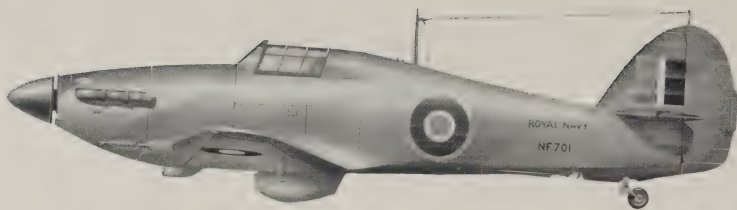
(Equipped with 44 gallon auxiliary (ferry or combat) drop tanks: Normal Ferry Weight, 7,594 lb.; Overload Combat Weight, 7,896 lb.)

- c. **Mark IIC (Temperate)**—Measured on aircraft Z2891 (14/3/41). Aircraft Tare Weight (with 18 gallons of coolant), 5,658 lb. Pilot and Parachute, 200 lb. Four 20-mm. guns, 425 lb. Ammunition boxes and belt feeds (364 rounds), 327 lb. Gunsight, 17 lb. G.45 camera, 9 lb. Pyrotechnics, 18 lb. Oxygen equipment, 15 lb. First Aid, 3 lb. T.R.1133 radio, 79 lb. R.3002 radio, 24 lb. Fuel (main, 69 gallons), 497 lb. Fuel (reserve, 28 gallons), 202 lb. Oil (7.5 gallons), 68 lb. *Aircraft Normal Loaded Weight*, 7,544 lb.

(Equipped with 44 gallon auxiliary (ferry or combat) drop tanks: Normal Ferry Weight, 7,619 lb.; Overload Combat Weight, 8,044 lb.)

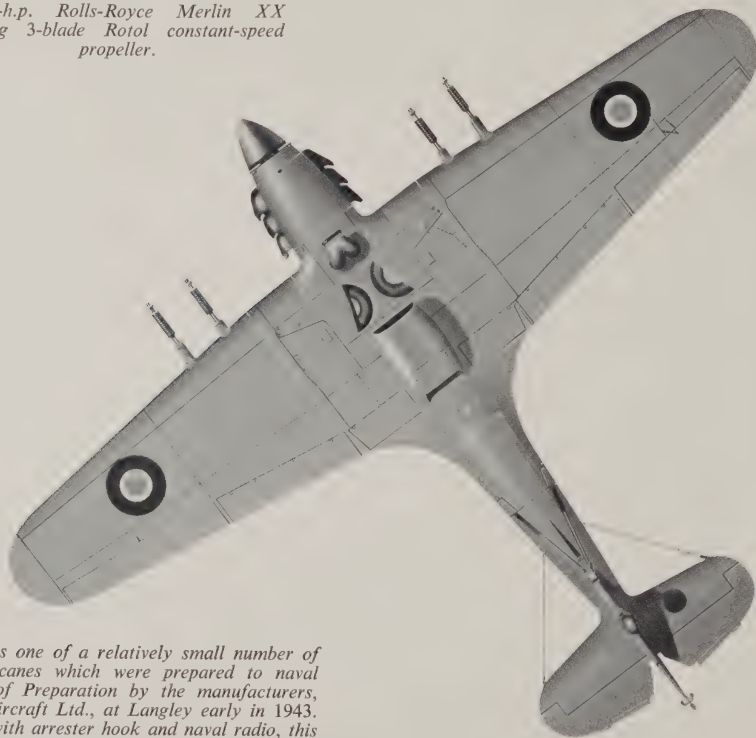
- d. **Mark IIC (Tropical)**—Aircraft Tare Weight, 5,785 lb. *Aircraft Normal Loaded Weight*, 7,707 lb.

(Equipped with 44 gallon auxiliary (ferry or combat) drop tanks: Normal Ferry Weight, 7,782 lb. Overload Combat Weight, 8,207 lb.)

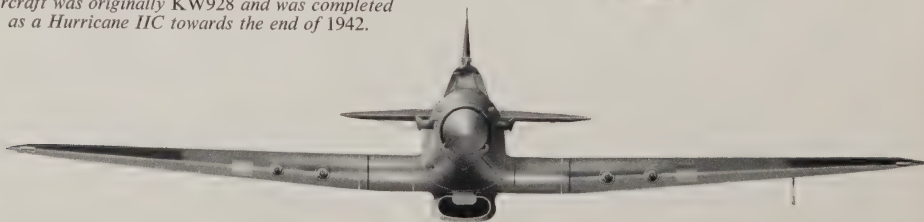


## THE HAWKER SEA HURRICANE MARK IIC

*1,260-h.p. Rolls-Royce Merlin XX  
driving 3-blade Rotol constant-speed  
propeller.*



*NF701 was one of a relatively small number of Sea Hurricanes which were prepared to naval Standard of Preparation by the manufacturers, Hawker Aircraft Ltd., at Langley early in 1943. Equipped with arrestor hook and naval radio, this aircraft was originally KW928 and was completed as a Hurricane IIC towards the end of 1942.*



e. *Mark IID (Tropical)*—Measured on aircraft BP173/G (28/7/42). Aircraft Tare Weight (with 18 gallons of coolant), 5,550 lb. Pilot and Parachute, 200 lb. Two Vickers "S" 40-mm. guns and two Browning guns, 893 lb. Ammunition (660 rounds of .303-in. and 30 rounds of 40-mm.), 230 lb. Gunsight (gyro), 54 lb. G.45 camera, 9 lb. Pyrotechnics, 26 lb. Oxygen equipment, 15 lb. First Aid, 3 lb. T.R.1133 radio, 79 lb. R.3002 radio, 24 lb. Fuel (main, 69 gallons), 497 lb. Fuel (reserve, 28 gallons), 202 lb. Oil (7.5 gallons), 68 lb. *Aircraft Normal Loaded Weight, 7,850 lb.*

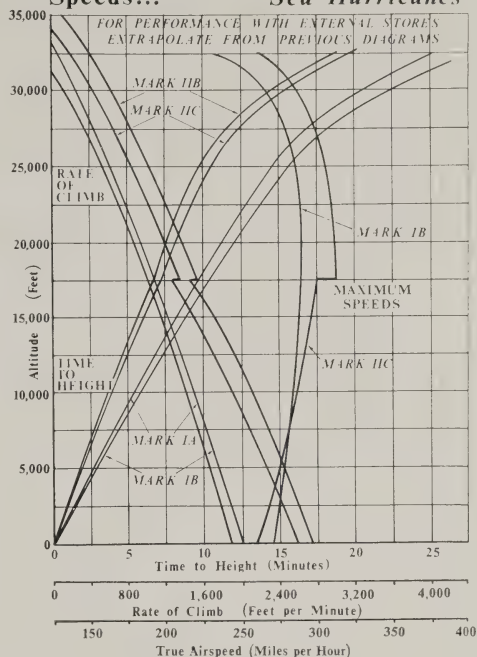
f. *Sea Hurricane Mark IIC (Temperate)*—Aircraft Tare Weight (with 18 gallons of coolant), 5,738 lb. Pilot and Parachute, 200 lb. Four 20-mm. guns, 425 lb. Ammunition boxes and belt feeds (364 rounds), 327 lb. Gunsight (gyro), 54 lb. Oxygen equipment, 15 lb. Naval radio, 92 lb. Fuel (main, 69 gallons), 497 lb. Fuel (reserve, 28 gallons), 202 lb. Oil (7.5 gallons), 68 lb. *Aircraft Normal Loaded Weight, 7,618 lb.* (Tropical Aircraft Normal Loaded Weight, 8,278 lb.)

g. *Mark II Maximum Ferry Overload Weight.*—(Tropical Mark IIC, carrying back and front armour, full ammunition and two 90-gallon ferry tanks) 9,145 lb.

**Performance** (see graphs for Maximum Speeds and Climb Performance)

a. *Range* (aircraft flying at optimum range speeds, 16,000 feet mean I.C.A.N. altitude, no fuel reserves.)

## Climb Performance & Maximum Speeds... Sea Hurricanes



	Optimum Range Speed T.A.S. (m.p.h.)	Range (statute miles)		
		Clean Aircraft	Two 44-Gallon Tanks	Two 90-Gallon Tanks
Mark IIA .. ..	177	468	946	1,090
Mark IIA (Trop.) ..	185	440	900	1,015
Mark IIB .. ..	177	465	935	1,080
Mark IIB (Trop.) ..	185	436	880	1,010
Mark IIC .. ..	178	460	920	1,086
Mark IIC (Trop.) ..	188	426	908	1,022
Mark IID .. ..	186	420	895	1,020
Mark IID (Trop.) ..	192	404	870	995
Sea Hurricane IIC ..	180	452	908	1,062
Ditto (Trop.) .. ..	190	415	895	998

b. *Stalling Speeds* (sea level)

Clean aircraft, wheels and flaps up, 75–85  
m.p.h. I.A.S.

Aircraft with stores, wheels and flaps up,  
80–90 m.p.h. I.A.S.

Clean aircraft, wheels and flaps down, 60–75

m.p.h. I.A.S.

Aircraft with stores, wheels and flaps down,  
65–80 m.p.h. I.A.S.

At the stall one wing tends to drop sharply,  
with flaps either up or down.

## THE HAWKER HURRICANE

### c. Fuel Consumption Weak Mixture—values in Gallons/Hour.

Boost lb./sq. in.	MS Gear 8,000–20,000 feet			S Gear 14,000–30,000 feet		
	2,650 r.p.m.	2,300 r.p.m.	2,000 r.p.m.	2,650 r.p.m.	2,300 r.p.m.	2,000 r.p.m.
+4	56	50	46	57	51	47
+2	52	46	42	53	47	43
0	47	42	38	48	43	39
−2	42	37	34	43	39	35
−4	37	33	30	38	34	31

### Rich Mixture—values in Gallons/Hour.

Boost lb./sq. in.	Engine speed r.p.m.	Fuel Consumption gallons/hour
+12	3,000	115
+ 9	3,000	100
+ 9	2,850	95
+ 7	2,650	80

d. *Aerobatics.* The following are the recommended minimum speeds,

280 m.p.h. I.A.S. for a loop,

220 m.p.h. I.A.S. for a roll,

300 m.p.h. I.A.S. for a half roll off loop

and 300 m.p.h. I.A.S. for an upward roll.

e. *Service Ceiling* (rate of climb, 100 ft./min.)

Mark IIA, 36,300 feet; Mark IIB, 36,000 feet;

Mark IIB (tropical), 33,600 feet; Mark IIC,

35,600 feet; Mark IIC (tropical), 33,200 feet;

Mark IID (tropical), 29,100 feet.

## THE PERSIAN HURRICANE MARK IIC TWO-SEAT FIGHTER TRAINER

**Powerplant.** Rolls-Royce Merlin 22. Engine develops 1,435 b.h.p. at 3,000 r.p.m. at 11,000 feet at +16 lb./sq. in. boost in S-Gear, and 1,460 b.h.p. at 3,000 r.p.m. at 6,250 feet at +14 lb./sq. in. boost in M-Gear; take-off power, 1,390 b.h.p. at 3,000 r.p.m. at +14 lb./sq. in. boost. Propeller, three-blade Rotol R.S.5/11.

**Weights.** Aircraft Tare Weight, 5,505 lb. Crew (two) and Parachute, 400 lb. Guns, ammunition, boxes and feeds, 810 lb. Service equipment, 645 lb. Fuel (total, 97 gallons), 699 lb. Oil (9 gallons), 81 lb. *Aircraft Normal Loaded Weight*, 8,140 lb.

**Performance.** (Standard atmospheric conditions) Maximum speed: 320 m.p.h. T.A.S. at 21,500 feet.

Normal Cruising speed: 275 m.p.h. T.A.S. at 20,000 feet.

Stalling speed, wheels and flaps down: 70 m.p.h. I.A.S.

Normal range: 640 statute miles at optimum range speed.

Range with 44-gallon tanks: 1,100 statute miles.

Initial rate of climb: 2,780 feet/minute.

Time to 20,000 feet: 10·0 minutes.

Service Ceiling (rate of climb, 100 ft./min.): 36,000 feet.

Take-off ground run: 250 yards in 5 kt. head-wind.

## THE HAWKER HURRICANE MARK IV

The Mark IV Hurricane was similar in most respects to the Mark IIC, being distributed in the same production line and using the same assembly jigs. The provision of universal "low attack" wings and attachment points, together with additional armour protection, resulted in greater weights and therefore reduced performance figures. The following figures are therefore quoted for the Hurricane IV with two Vickers 40-mm. anti-tank guns for ease of comparison with the Hurricane IID.

**Weights.** Mark IV (Tropical)—Measured on aircraft KZ198. Aircraft Tare Weight (with 18 gallons of coolant), 6,150 lb. Pilot and Parachute, 200 lb. Two Vickers "S" 40-mm. guns, and two Browning guns, 905 lb. Ammunition 230 lb. Equipment, 210 lb. Fuel (main, 69 gallons), 497 lb. Fuel (reserve, 28 gallons), 202 lb. Oil (7·5 gallons), 68 lb. *Aircraft Normal Loaded Weight*, 8,462 lb.

## Chapter 15

# NOTES ON INDIVIDUAL AIRCRAFT, PRODUCTION DETAILS AND SERVICE ALLOCATION

**THE HAWKER F.36/34 HURRICANE PROTOTYPE.** One prototype, *K5083*, developed and designed to Air Ministry Specification F.36/34 and ordered under Contract No. 357483/34. Powered by Rolls-Royce Merlin "C", first flown on 6th November 1935 by Flt. Lt. P. W. S. Bulman at Brooklands. Armament of eight Browning guns not fitted until 1937. Trials at Brooklands, Martlesham Heath and Farnborough, 1935-37.

**THE HAWKER HURRICANE MARK I (HAWKER-BUILT).** First production batch of 600 aircraft, *L1547-L2146*, developed to Production Specification 15/36, and ordered under Contract No. 527112/36, dated 3rd June 1936. First flight by *L1547*, 12th October, 1937. Deliveries commenced (to No. 111 (Fighter) Sqdn., Northolt), 15th December 1937; deliveries of batch completed 6th October 1939. Average rate of production, about one aircraft per day. Rolls-Royce Merlin II engines and Watts wooden propellers fitted initially; many later replaced by Merlin III's and Rotol or de Havilland variable pitch propellers. Eight .303-inch Browning gun armament. Fabric-covered wings fitted to almost all aircraft, but later aircraft were sometimes repaired using metal stressed-skin wings.

No. 1 (F) Sqdn., Vassincourt, France, 10/39: *L1671, L1673, L1676-L1682, L1685* (shot down enemy aircraft, 2/4/40), *L1686-L1694, L1842-L1844, L1855, L1905, L1925, L1927, L1959-L1979* (initial issue), *L2061* (replacement).

No. 3 (F) Sqdn., Biggin Hill, 1938-39: *L1565-L1573* (initial issue), *L1576-L1580, L1582, L1586-L1588, L1631, L1917, L1923, L1924, L1926, L1928* (crashed during Squadron's first night flying, 29/8/39; pilot safe), *L1932-L1940, L1962, L1973*.

No. 29 (F) Sqdn.: *L2080-L2084, L2086-L2091, L2092* (damaged by enemy action and repaired by Rollasons, 1940).

No. 32 (F) Sqdn., Biggin Hill, 2/40: *L1596, L1647, L1655, L1658-L1668* (initial issue), *L1670, L1672, L1674, L1675, L1835, L1836, L1841, L1972, L2049, L2050, L2063*.

No. 43 (F) Sqdn.: *L1704, L1723, L1725-L1739* (initial issue), *L1744, L1824, L1825, L1847, L1849, L1955, L2066* (replacement).

No. 46 (F) Sqdn., Digby, 9/39: *L1791-L1797, L1801-L1807, L1813-L1817* (initial issue), *L1853* (P/O McGregor shot down Ju 88 over Tjelbotn, Norway, 28/5/40), *L1854, L1857, L1892, L2071*. (See footnote on page 45, for those aircraft despatched to Norway aboard H.M.S. *Glorious*, 1940).

No. 56 (F) Sqdn., 1938-39: *L1553, L1584, L1590-L1595, L1597-L1603, L1605, L1606* (later G-AFKX, see Trials Aircraft below), *L1607-L1611* (initial issue); *L1645, L1742* (replacements); *L1828-L1830, L1972, L1980-L1992, L1998-L2006* (second issue).

No. 73 (F) Sqdn., Caen, France, 9/39: *L1633, L1657, L1826, L1827, L1864; Le Mans, 6/40: L2047, L2076*.

No. 74 (F) Sqdn., temporary charge, 1939: *L1581*.

No. 79 (F) Sqdn., Biggin Hill, 1939, and Merville, France, 1940: *L1697-L1701, L1705, L1707* (Paris Aero Show 1938), *L1709, L1712, L1714-L1716, L1718-L1722, L1781, L1782, L1784, L1845, L1846, L2140*.

No. 85 (F) Sqdn., Air Component, France, 1939: *L1604, L1632, L1634-L1637, L1639-L1644, L1648-L1651, L1653, L1656, L1765, L1773-L1775, L1778, L1779, L1833, L1834*.

No. 87 (F) Sqdn.: *L1612-L1630, L1646, L1743, L1744, L1776, L1777, L1831, L1832*.

No. 111 (F) Sqdn., Northolt, 1938: *L1548-L1561, L1563, L1564; Northolt, 1939: L1581, L1583, L1584, L1589, L1607* (comparative evaluation with Boulton-Paul Defiant, October 1939), *L1638, L1654, L1694, L1720, L1730, L1740, L1741, L1748, L1774, L1820, L1821, L1822* (F/O Ferris shot down four Bf 110's (confirmed), 18/5/40, near Dunkirk), *L1823* (last Hurricane with Watts wooden propeller disposed of by Squadron, 1/7/40), *L1830* (crashed, 24/4/40), *L1973* (F/O Dutton destroyed He 111K 8/3/40), *L2001, L2051* (shot down by Bf 109E, 18/5/40).

No. 151 (F) Sqdn., 1940: *L1724, L1745-L1749, L1753-L1758, L1764, L1766-L1769, L1798, L1799, L1850*.  
No. 213 (F) Sqdn., Wittering, 1940: *L1770-L1772, L1780, L1782-L1790, L1800, L1808-L1812, L1818*,

## THE HAWKER HURRICANE

*L1819, L1851, L1852, L2060, L2062.*

No. 501 Sqdn., A.A.F., Tangmere, 1/40: *L1659, L1636, L1866–L1872, L1874–L1876, L1910, L1911, L1949, L1953, L2037, L2038, L2039, L2045, L2046, L2052–L2056, L2124.*

No. 504 Sqdn., Debden and Martlesham Heath, 4/40: *L1639, L1836, L1911–L1913, L1915, L1916, L1942–L1948, L1950–L1952, L1954, L1956, L1957; Filton and Exeter, 12/40: L1583 (with L1913, intercepted raid on London, 15/9/40).*

No. 605 Sqdn., A.A.F., Tangmere, 1/40: *L2012–L2014, L2018, L2058, L2059, L2061; Drem, 8/40: L2103, L2117, L2118, L2119–L2122.*

No. 610 Sqdn., A.A.F.: *L2115, L2117–L2123.*

No. 616 Sqdn., A.A.F.: *L2098, L2101, L2103.*

Other R.A.F. Flying Units: *L1683, L1684 (Northolt Stn. Flt.); L1742 (No. 5 (P) A.F.U., 1942); L1747 (No. 9 (P) A.F.U., 1942); L1873 (No. 23 (Training) Group for Central Flying School, Upavon); L1895–L1897 (Advanced Training Pool, Andover, April 1939); L2006–L2011 (No. 11 Group, Andover); L2098 (No. 55 O.C.U., Aston Down, 11/40); L1910, L2006 (No. 56 O.T.U., Sutton Bridge, 11/40); L2057 (No. 71 O.T.U.); L2064, L2069, L2070, L2072–L2075 (No. 11 Group Pool, Andover, 8/39).*

Delivered into Reserve with Maintenance Units: *L1652 (crashed, 1938, killing John Hindmarsh, Hawker Test Pilot; aircraft to No. 4 Disposal M.U.); L1596 (also to No. 4 M.U.); No. 5 M.U., Kemble: L1856, L2037–L2039, L2045, L2046, L2051, L2065, L2067, L2068, L2116, L2141–L2143, L2145; No. 8 M.U.: L1865, L1889, L1891, L1892, L1894, L1898–L1916, L1921, L1922, L1925, L1927, L1929–L1931; No. 10 M.U., Little Rissington: L2015–L2017, L2019, L2024, L2025, L2027–L2030, L2048 (later to Poland; see below); No. 20 M.U.: L2146; No. 27 M.U.: L2047, L2049, L2050, L2057; Packing Depot, Sealand: L1585.*

Aircraft for South Africa; delivered *via* No. 36 M.U., 11/38: *L1708, L1710, L1711.*

Aircraft for Yugoslavia; deliveries commenced 15/12/38. (Yugoslav nos. in brackets): *L1751 (1–205), L1752 (2–206), L1837 (3–291), L1838 (4–292), L1839 (5–293), L1840 (6–294), L1858 (7–312), L1859 (8–313), L1860 (9–314), L1861 (10–315), L1862 (11–316), L1863 (12–317). Total, 12 aircraft.*

Aircraft for Rumania; deliveries commenced 28/8/39: *L2077, L2078, L2085, L2093–L2097, L2104, L2112–L2114. Total, 12 aircraft.*

Aircraft for Canada; deliveries commenced, 10/38. (R.C.A.F. nos. in brackets): *L1759 (310), L1760 (311), L1761 (312), L1762 (313), L1763 (314), L1878 (315), L1879 (316), L1880 (317), L1881 (318), L1882 (319), L1883 (320), L1884 (321; returned to U.K. and developed into Hillson F.H.40 Slip-wing Hurricane), L1885 (322), L1886 (323), L1887 (324), L1888 (325), L1890 (326), L2021 (327), L2022 (328), L2023 (329); L1848 delivered as pattern aircraft, 2/3/39; L2144 delivered as sample material for proposed*

Canadian production, 28/9/39. Total, 22 aircraft.

Aircraft for Belgium; deliveries commenced, 4/39. (Belgian nos. in brackets): *L1918 (1), L1919 (2), L1920 (3), L1993 (4), L1994 (5), L1995 (6), L1996 (7), L1997 (8), L2040 (9), L2041 (10), L2042 (11), L2043 (12), L2044 (13), L2105 (14), L2106 (15), L2107 (16), L2108 (17), L2109 (18), L2110 (19), L2111 (20). Total of 20 aircraft exported, of which 15 reached operational service. At least two other (licence-built) aircraft were completed (under Contract No. B.655029/37) before German invasion of 1940.*

Aircraft for Poland. One aircraft, *L2048*, shipped 24/7/39.

Aircraft for Persia. One aircraft, *L2079 (252)*, shipped 1939.

Aircraft for Turkey; fifteen machines, *L2125–L2139*; deliveries commenced, 14/9/39; completed 6/10/39. Exhibition aircraft: *L1575* (Glasgow Exhibition, 5/38); *L1941* (Nottingham Exhibition, 5/39); *L1592* (exhibited in Science Museum from 1955; re-conditioned by H.A.L., 1961).

Trials aircraft: *L1547* (performance and handling trials, H.A.L.); *L1562, L1574* (trials, Martlesham Heath, 1939); *L1582* (experimental colour schemes, H.A.L.); *L1606* (from No. 56 Sqdn., to H.A.L. for modification and re-registration as *G-AFKX*); *L1638* (hydraulic trials, H.A.L.); *L1669* (first tropical aircraft; to Rolls-Royce, thence to Middle East for trials); *L1695* (A. & A.E.E. propeller trials); *L1696* (A. & A.E.E. slotted wing trials); *L1702* (R.A.E. trials); *L1713* (trials with R.A.E., 1938, and Rolls-Royce, 1939); *L1717* (R.A.E. trials); *L1750* (trials with extra armour and two 20-mm. guns under wings); *L1856* (Merlin XII test bed; later to No. 5 M.U. as standard); *L1887* (first with metal stressed skin wings).

**THE HAWKER HURRICANE MARK I (HAWKER-BUILT).** First production batch of 300 aircraft built by Hawker Aircraft Ltd., Kingston and Brooklands, under Contract No. 751458/38, during 1939–40. First 80 aircraft built with fabric-covered wings (some of these were later repaired using metal wings); all remainder were built with metal wings. Rolls-Royce Merlin III engines driving Rotol or de Havilland variable-pitch propellers. *N2318–N2367, N2380–N2409, N2422–N2441, N2453–N2502, N2520–N2559, N2582–N2631, N2645–N2729.* Deliveries commenced, 29/9/39; completed 1/5/40. Average rate of production, about two aircraft per day.

No. 1 (F) Sqdn., Vassincourt, France, 3/40: *N2326, N2334, N2358, N2380–N2382, N2384, N2386.*

No. 32 (F) Sqdn., Biggin Hill, 1940: *N2406* (P/O Blackford destroyed Bf 109E, 22/5/40), *N2409, N2459* (P/O Grice destroyed Bf 109E, 22/5/40), *N2460, N2461* (F/L Crossley destroyed Bf 109E, 22/5/40, and another 20/7/40), *N2462–N2464, N2524, N2527* (P/O Daw destroyed Bf 109E, 22/5/40), *N2532* (S/L Worrall damaged three Bf 109E's, 20/7/40), *N2582* (P/O Humpherson

# PRODUCTION DETAILS AND SERVICE ALLOCATION

destroyed Bf 109E, 22/5/40), N2583, N2657, N2670 (shot down over North Foreland, 20/7/40), N2727.  
 No. 43 (F) Sqdn., Wick, 1940: N2618.  
 No. 46 (F) Sqdn., Bardufoss, Norway, 1940: N2543, N2633.  
 No. 56 (F) Sqdn., 1940: N2386, N2398, N2399, N2400, N2402, N2423, N2428–N2432, N2434, N2437, N2439–N2441, N2468, N2478–N2480, N2522, N2523, N2550, N2553, N2617, N2659, N2664–N2668, N2712.  
 No. 79 (F) Sqdn., 1940: N2671.  
 No. 111 (F) Sqdn., Drem and Wick, 1939–40: N2340 (S/L H. Broadhurst, D.F.C., A.F.C., destroyed He 111K, 29/11/39; first victory of the Squadron), N2482, N2549.  
 No. 145 (F) Sqdn., 1940: N2583, N2601, N2604, N2610, N2614, N2700, N2701, N2711, N2713.  
 No. 208 (AC) Sqdn., El Khanka, Egypt, 10/41: N2626.  
 No. 249 (F) Sqdn.: N2440 (in action over Brooklands, 4/9/40).  
 No. 253 (F) Sqdn.: N2588 (in action over Brooklands, 4/9/40).  
 No. 274 (F) Sqdn., Middle East, 1940: N2498, N2499, N2624 (semi-tropicalised Mark I's).  
 No. 501 Sqdn., A.A.F., France, 1940: N2329, N2549.  
 No. 504 Sqdn., A.A.F., Martlesham Heath, 4/40: N2471, N2705; Filton and Exeter, 12/40: N2481, N2669.  
 No. 605 Sqdn., A.A.F., Tangmere, 1/40: N2349, N2352.  
 Aircraft shipped to Poland, 9/39, but later diverted to the Middle East: N2322–N2324, N2327, N2349, N2392–N2395.  
 Aircraft for Yugoslavia. 12 aircraft shipped during February and March 1940: N2718–N2729.  
 Aircraft damaged in action, 1940, and repaired by Rollasons: N2328, N2427, N2586, N2590, N2704.  
 No. 56 O.T.U., 11/40: N2365, N2463, N2469.  
 No. 59 O.T.U., 12/43: N2455, N2471, N2555.  
 No. 71 O.T.U., 1941: N2483, N2674.  
 Other aircraft: N2318 (Rolls-Royce engine trials); N2359 (No. 6 O.T.U.); N2365 (No. 9 (P) A.F.U.); N2422 (first production aircraft with metal wings); N2460 (No. 1510 Flt.); N2488 (No. 6 O.T.U.); N2520 (No. 55 O.T.U.); N2541 (de-icing trials, H.A.L., 1940); N2599 (later converted to Sea Hurricane Mk. IA); N2646 (hydraulic trials, H.A.L., 1940); N2530 (work commenced under W/O 7522 and C/N 29838/39 to convert this aircraft to a two-seat trainer, but cancelled 10/1/40); N2625, N2626 (at Takoradi, 11/40, en route for Middle East).

**THE HAWKER HURRICANE MARK I (GLOSTER-BUILT).** First production batch of 500 aircraft built by Gloster Aircraft Co., Ltd., Brockworth, during 1939–40 under Contract No. 962371/38/C.23a. Rolls-Royce Merlin III engines and D.H. or Rotol propellers. First flight, 20th October 1939. P2535–P2584, P2614–P2653, P2672–P2701, P2713–P2732, P2751–P2770, P2792–P2836, P2854–P2888, P2900–

P2924, P2946–P2995, P3020–P3069, P3080–P3124, P3140–P3179, P3200–P3234, P3250–P3264.  
 No. 1 (F) Sqdn., Vassincourt, France, 3/40: P2546, P2548, Northolt, 7/40: P2571, P2649, P2686, P2751, P2877, P2980, P3042, P3043, P3044 (missing, 3/9/40), P3047 (shot down, 15/8/40), P3105, P3167, P3169, P3170, P3172 (shot down, 11/8/40), P3229.  
 No. 3 (F) Sqdn., Croydon, 1940: P3143 ("Z").  
 No. 6 (F) Sqdn., Helwan, 2/42: P3067.  
 No. 32 (F) Sqdn., Biggin Hill, 5/40: P2755 (F/L Jeff destroyed Bf 109, 22/5/40), P3112 (F/O Humpherson destroyed Ju 87, 20/7/40), P3200, P3214, P3219.  
 No. 43 (F) Sqdn.: P3140.  
 No. 46 (F) Sqdn., Digby, 1940: P3024, P3026, P3030, P3031, P3052, P3053, P3062–P3064, P3066, P3067, P3114.  
 No. 56 (F) Sqdn., 1940: P2556, P2677, P2692, P2822, P2857 ("H"), P2863, P2866, P2882, P2910, P2922, P2970, P2985, P3028, P3055, P3123, P3152.  
 No. 73 (F) Sqdn., Le Mans, France, 6/40: P2559 ("D"), P2571 ("X"), P2579 ("J"); Debden and Hornchurch, 10/40: P2815, P2975, P2984, P3034; Sidi Haneish, 1/41: P2640.  
 No. 79 (F) Sqdn., 1940: P3122.  
 No. 80 (F) Sqdn.: P2864.  
 No. 85 (F) Sqdn., 1940: P3119 ("X"), P3124 ("L").  
 No. 87 (F) Sqdn., 1940: P2798 ("A"), P2829 ("G"), P2865 ("X"), P2875–P2877, P2881.  
 No. 111 (F) Sqdn., North Weald and Hawkinge, 1940: P2806, P2884, P2885 (shot down, 5/6/40), P2886 (shot down, 13/3/41), P2888, P2958 (crashed on take-off, Hawkinge, 14/7/40), P2979, P3029, P3044, P3046, P3054, P3105, P3106.  
 No. 116 (F) Sqdn.: P3212.  
 No. 145 (F) Sqdn., 1940: P3143 ("Z").  
 No. 151 (F) Sqdn., 1940: P3065 ("G").  
 No. 208 (AC) Sqdn., Burg El Arab, 1942: P2638 (Tropical P.R. Mark I, shot down by three Bf 109F's 24/7/42).  
 No. 239 (F) Sqdn.: P2949, P2956.  
 No. 245 (F) Sqdn., 1940: P2884, P3165, P3152.  
 No. 249 (F) Sqdn., 1940: P2863 (in action over Brooklands, 4/9/40).  
 No. 253 (F) Sqdn., 1940: P2692, P2865, P2883, P3032 (in action over Brooklands, 4/9/40), P3213.  
 No. 257 (F) Sqdn., North Weald, 11/40: P2835 (P/O Mortimer destroyed BR20, 11/11/40), P2960, P3049; Northolt: P2981 (missing, 8/8/40).  
 No. 274 (F) Sqdn., Sidi Haneish, 11/40: P2638–P2641, P2643, P2651.  
 No. 303 (Polish) Sqdn., R.A.F., 1940: P3069 ("C").  
 No. 401 Sqdn., R.C.A.F.: P3080 ("C").  
 No. 402 Sqdn., R.C.A.F.: P3021 ("X").  
 No. 501 Sqdn., A.A.F., Anglure, France, 5/40: P2714 ("F"), P2760 ("B"), P2768 ("E"); Battle of Britain, 7/40: P2485, P2691, P3040, P3041, P3082, P3083 ("E"), P3084, P3141 ("W").  
 No. 504 Sqdn., A.A.F., Hendon. Following aircraft intercepted raid on London, 15/9/40:—P2725 (Sgt. Holmes rammed He 111K over Victoria Station), P2908, P2987.

## THE HAWKER HURRICANE

No. 527 Sqdn.: P2992 ("P").  
 No. 601 Sqdn., A.A.F., 1940: P2573, P2673 ("N").  
 No. 607 Sqdn., A.A.F., 1940: P2874 ("F"), P2879, P2901.  
 No. 615 Sqdn., A.A.F., 1940: P2564, P2578.  
 No. 680 (PR) Sqdn., Middle East, 1943: P2915 (used for communications).  
 No. 55 O.T.U.: P2881, P2887, P3146.  
 No. 59 O.T.U.: P2630, P2679, P2877, P3089, P3095.  
 No. 4 (C) F.P.P. (Ferry Pool), 1940: P2640, P2641, P2948, P2987.  
 Tropical Mark I's to Middle East via Takoradi, 1940: P2638–P2641, P2643, P2651.  
 Conversions to Mark II Series 1 (1940; subsequent identities in brackets): P2682 (DG641), P2829 (DR355), P2835 (DR353), P2863 (DR368), P2904 (DR357), P2908 (DR369), P2975 (DR372), P3023 (DR342), P3103 (DR340), P3106 (DR370), P3151 (DR350).  
 Other Aircraft: P2968 (No. 9 (P) A.F.U. and No. 9 F.T.S., 8/41), P2617 (No. 9 F.T.S., 8/41), P2968 (supplied to Eire as 107, 2/44); P2972, P3090 (later converted to Sea Hurricane Mark IA); P3178, P3218 (No. 5 (P) A.F.U.), P3250 (No. 71 O.T.U.).

**THE HAWKER HURRICANE MARK I (GLOSTER-BUILT).** Second production batch of 100 aircraft built by Gloster Aircraft Co., Ltd., Brockworth, during 1940, under Contract No. 19773/39/C.23a. Rolls-Royce Merlin III engines and D.H. or Rotol propellers. R4074–R4123, R4171–R4200, R4213–R4232.

No. 32 (F) Sqdn., Biggin Hill, 1940: R4081.  
 No. 43 (F) Sqdn., 1940: R4107–R4110.  
 No. 87 (F) Sqdn., 1940: R4228 ("X").  
 No. 111 (F) Sqdn., Croydon, 8/40: R4086, R4115, R4118, R4183 (shot down, pilot safe, 15/8/40), R4188, R4193, R4195, R4226.  
 No. 249 (F) Sqdn., 9/40: R4229 (in action over Brooklands, 4/9/40).  
 No. 257 (F) Sqdn., Northolt, 8/40: R4088, R4094 (missing 8/8/40), R4189; North Weald, 10/40: R4188 (Sgt. Lucas destroyed Fiat CR42, 11/11/40), R4190, R4195.  
 No. 504 Sqdn., A.A.F., 10/40: R4178.  
 Conversions to Mark II Series 1 (1940; subsequent identities in brackets): R4081 (DR358), R4091 (DR373), R4218 (BV155; served with No. 73 (F) Sqdn., at El Adem, 2/42).

**THE HAWKER HURRICANE MARK I AND II (GLOSTER-BUILT).** Third (main) production batch of 1,700 aircraft built by Gloster Aircraft Co., Ltd., Brockworth, during 1940–41, under Contract No. 857/30/40/C.23a.

**Part 1. 500 HURRICANE MARK I's.** Rolls-Royce Merlin III engines. V6533–V6582, V6600–V6649, V6665–V6704, V6722–V6761, V6766–V6825, V6840–V6889, V6913–V6952, V6979–V7028, V7042–V7081, V7099–V7138, V7156–V7195.  
 No. 1 (F) Sqdn., Kenley, 1941: V6932, V6933, V6997.  
 No. 32 (F) Sqdn., Acklington, 10/40: V6724.

No. 46 (F) Sqdn., Sherburn-in-Elmet, 4/41: V6818, V7075.  
 No. 56 (F) Sqdn., 1941: V6534, V6944, V7100, V7105, V7176 ("P"), V7179.  
 No. 71 (F) Sqdn., 1941: V6814 ("C"), V6919 ("T").  
 No. 73 (F) Sqdn., Debden and Hornchurch, 10/40: V6677, V6738, V6857 (shot down, 11/10/40).  
 No. 85 (F) Sqdn., 12/40: V6611 ("U"), V6672 ("U"), V6730 ("O"), V7074.  
 No. 87 (F) Sqdn., 1/41: V6915 ("P"), V6960 ("E").  
 No. 111 (F) Sqdn., 8/40: V6538, V6539, V6562, V6606, V6613, V6696, V6701, V6868, V6984, V6985.  
 No. 249 (F) Sqdn.; aircraft in action over Brooklands, 4/9/40: V6559, V6610 (crashed, 7/9/40), V6614, V6625, V6635.  
 No. 253 (F) Sqdn.: V6637 (in action over Brooklands, 4/9/40).  
 No. 257 (F) Sqdn., North Weald, 11/40: V6558, V6604, V6671, V6680 (P/O Kay destroyed BR20, 11/11/40), V6722 ("P"), V6802, V6864 (P/O North destroyed BR20, 11/11/40), V6873 ("O"), V7076, V7137 ("G"), V7167 ("H"), V7186 (crashed, 1/1/41).  
 No. 310 (Czech) Sqdn., R.A.F.: V6737 ("R").  
 No. 501 Sqdn., A.A.F., 1940: V6799 ("X").  
 No. 504 Sqdn., A.A.F., Filton and Exeter, 12/40: V6695, V6700, V6731, V6732, V6750, V6819.  
 No. 601 Sqdn., A.A.F., 1/41: V6808 ("D").  
 No. 680 (PR) Sqdn., Middle East, 1943: V6738, V6747 (used for communications).  
 No. 41 O.T.U.: V6741 (Sea Hurricane Mk. IC).  
 No. 55 O.T.U.: V6573, V6728, V7137.  
 No. 59 O.T.U.: V6613, V6637, V6680, V6728, V6877, V6913, V6918, V6997, V7075, V7180.  
 Conversions to Mark IIA Series 1 (1940; subsequent identities in brackets): V6535 (DG630; to No. 208 (AC) Sqdn., Burg-el-Arab, 11/42); V6538 (DR371); V6546 (DR374); V6582 (DG639); V6602 (DG638); V6735 (DR352); V6757 (DG619); V6785 (BV157); V6790 (BV196); V6853 (DG643); V6861 (DG650); V6914 (BV165); V6915 (DR351); V6929 (DG647); V6936 (DR360); V6942 (DR391); V6950 (DG624); V6959 (DG627); V6999 (DG648); V7006 (DR347); V7018 (DR392); V7021 (DR394); V7169 (DR339).  
 Other Aircraft: V6552 (later converted to Mark I trainer; armament removed); V6557 (trials at T.R.E., Malvern); V6700, V6801, V6802, V7049 (converted to Sea Hurricane Mk. IA's); V6757, V6813, V7103 (tropical Mk. I's; to No. 71 O.T.U., N. Africa); V6784, V7168 (No. 5 (P) A.F.U.); V6940 (No. 9 (P) A.F.U.); V6796 (No. 15 (P) A.F.U.); V7173 (supplied to Eire, 12/43, as 109).

**Part 2. 200 HURRICANE MARK I's.** Rolls-Royce Merlin III engines. W9110–W9159, W9170–W9209, W9215–W9244, W9260–W9279, W9290–W9329, W9340–W9359.  
 No. 1 (F) Sqdn., Kenley, 1941: W9151, W9181.  
 No. 46 (F) Sqdn., Sherburn-in-Elmet, 1941: W9110, W9244, W9301, W9324.

# PRODUCTION DETAILS AND SERVICE ALLOCATION

No. 73 (F) Sqdn., Bu Amoud, 1941: *W9197*, *W9198*, *W9231*, *W9268*, *W9293* (in action over Mersa Metruh, 5/41).  
 No. 87 (F) Sqdn., 1941: *W9154* ("D"), *W9173* ("V"), *W9196* ("B").  
 No. 111 (F) Sqdn., 2/41: *W9112*, *W9114*, *W9117*, *W9179*, *W9308*.  
 No. 208 (AC) Sqdn., Middle East detachments, 1942: *W9267* (trop. Tac R Mk. I, Tmimi, 1/42), *W9300* (trop. Tac R Mk. I, Msus, 1/42), *W9328* (trop. Tac R Mk. I, Antelat, 1/42), *W9354* (trop. Tac R Mk. I, Bu Amoud, 5/42).  
 No. 213 (F) Sqdn., Famagusta, Cyprus, 6/41: *W9238*, *W9265*, *W9270* ("A"), *W9274*, *W9290* ("B"), *W9291*, *W9309*, *W9349* ("E"), *W9350*.  
 No. 257 (F) Sqdn., 1941: *W9130* ("K"), *W9281*, *W9306*.  
 No. 274 (F) Sqdn., 1941: *W9197*, *W9269*, *W9296*.  
 No. 335 (Hellenic) Sqdn., R.A.F., Middle East, 1942: *W9155*, *W9290*.  
 No. 680 (PR) Sqdn., Middle East, 1943: *W9225*, *W9242* (used for communications).  
 No. 2 P.R.U., Middle East, 1941: *W9116* (3-camera P.R. Mk. I; missing over Benghazi, 3/10/41); *W9353* (identical to and replacement for *W9116*).  
 No. 1413 Met. Flt., Lydda, 1944: *W9155* (converted to Met. (Trop.) Mk. I).  
 No. 55 O.T.U.: *W9196*.  
 No. 59 O.T.U.: *W9112*, *W9177*, *W9202*, *W9342*.  
 Conversions to Mark II Series 1 (1941; subsequent identities in brackets): *W9191* (*DR345*); *W9265* (*DR356*).  
 Other Aircraft: *W9185* (No. 71 O.T.U., North Africa); *W9313* (converted to Sea Hurricane Mk. IA); *W9314* (trial installation of four 20-mm. gun armament, A. & A.E.E., 1/41).

## Part 3. 519. HURRICANE MARK I's. Rolls-Royce Merlin III engines. *Z4022-Z4071*, *Z4085-Z4119*, *Z4161-Z4205*, *Z4223-Z4272*, *Z4308-Z4327*, *Z4347-Z4391*, *Z4415-Z4434*, *Z4482-Z4516*, *Z4532-Z4581*, *Z4603-Z4652*, *Z4686-Z4720*, *Z4760-Z4809*, *Z4832-Z4865*.

No. 6 (F) Sqdn., Helwan, 1/42: *Z4350*.  
 No. 43 (F) Sqdn., 1941: *Z4515* ("U"), *Z4609* ("T"), *Z4842* ("L").  
 No. 73 (F) Sqdn., Mersa Matruh, 1941: *Z4173*, *Z4190* (missing, Tobruk, 26/6/41), *Z4238*, *Z4366*, *Z4491*, *Z4630*, *Z4697*, *Z4773*.  
 No. 95 (MR) Sqdn., Freetown, West Africa (Sqdn. Fighter Flt.): *Z4257* (collided with Douglas DC-2, 7/9/42).  
 No. 98 (B) Sqdn., Kaldadarnes, Iceland, 7/41: *Z4607* (crashed, 23/9/41), *Z4617*, *Z4631*, *Z4639*, *Z4702*.  
 No. 208 (AC) Sqdn., El Khanka, Egypt, 10/41; trop. Tac R Mk. I's: *Z4063*, *Z4231* (3-camera P.R. Mk. I), *Z4252*, *Z4486*, *Z4489*, *Z4539*, *Z4554*, *Z4555*, *Z4616*, *Z4772* (long range aircraft; abandoned at L.G.134, near Sollum, 10/41), *Z4775* (long range aircraft operating from Gaza and Ramleh, 6/41), *Z4864*.

No. 213 (F) Sqdn., Famagusta, Cyprus, 6/41: *Z4089* ("U"), *Z4095* ("W"), *Z4163* ("M"), *Z4203*, *Z4205* (crashed, 29/12/41), *Z4225*, *Z4242* ("X"), *Z4361* ("B"), *Z4367* ("G"), *Z4374* ("Y").  
 No. 267 Sqdn., Heliopolis, 4/42: *Z4700*.  
 No. 274 (F) Sqdn., Western Desert, 1941: *Z4097*.  
 No. 335 (Hellenic) Sqdn., R.A.F., Middle East, 1942: *Z4007* (Fuqa, 10/42), *Z4233* (Bardia, 2/42), *Z4494*, *Z4604* (Aqir, Palestine; crashed, 15/11/41, but repaired), *Z4652* (missing, 14/3/42), *Z4809*.  
 No. 451 Sqdn., R.C.A.F., Middle East, 1941: *Z4231* (3-camera trop. P.R. Mk. I).  
 No. 680 (PR) Sqdn., Cyprus, 1944: *Z4604* (used for communications).  
 No. 2 P.R.U., Middle East, 1941: *Z4182* (trop. P.R. Mk. I).  
 No. 1423 Flt., Reykjavik, Iceland, 8/41: *Z4607* (crashed, 23/9/41), *Z4617*, *Z4631*, *Z4639*, *Z4702*.  
 No. 71 O.T.U., North Africa: *Z4093*, *Z4102*, *Z4113*, *Z4266*, *Z4380*, *Z4425*, *Z4491*, *Z4837*, *Z4855*.  
 Other Aircraft: *Z4037* (supplied to Eire, 7/43, as 106); *Z4576* (trials with modified oil system, G.A.C.); *Z4646* (trials with modified filter fairing, G.A.C. and A. & A.E.E.); *Z4770* (tests with various spinners); *Z4809* (tests with various paint schemes, R.A.E.); *Z4838* (night flying equipment tests, Boscombe Down and R.A.E.).

## Part 4. 481 HURRICANE MARK IIA SERIES 2's AND MARK IIB'S (Total of 140 Mk. IIA's and 341 Mk. IIB's). Rolls-Royce Merlin XX engines driving Rotol or D.H. 3-blade variable pitch propellers. *Z4866-Z4876*, *Z4920-Z4969*, *Z4987-Z5006*, *Z5038-Z5087*, *Z5117-Z5161*, *Z5202-Z5236*, *Z5252-Z5271*, *Z5302-Z5351*, *Z5376-Z5395*, *Z5434-Z5483*, *Z5529-Z5563*, *Z5580-Z5629*, *Z5649-Z5693*.

No. 43 (F) Sqdn., 1941: *Z4999*, *Z5203*.  
 No. 63 (F) Sqdn., 1941: *Z4967* ("O").  
 No. 73 (F) Sqdn., 1942: *Z5312* (trop. Mk. IIB; shot down, El Adem, 8/2/42).  
 No. 81 (F) Sqdn., Vaenga, North Russia, 1941: *Z5122*, *Z5157*, *Z5207*, *Z5208*, *Z5209*, *Z5228*, *Z5252*, *Z5349*.  
 No. 128 (F) Sqdn., 1942: *Z4967* ("D").  
 No. 134 (F) Sqdn., Vaenga, North Russia, 1941: *Z5529*.  
 No. 208 (AC) Sqdn., Middle East, 1942: *Z4950* (missing, 7/9/42), *Z4954*, *Z4958*.  
 No. 213 (F) Sqdn.: *Z5004* ("A"), *Z5005* ("B").  
 No. 257 (F) Sqdn., 1941; Mk. IIB's: *Z5044*, *Z5045*, *Z5050* ("T"), *Z5083*.  
 No. 274 (F) Sqdn., 1941: *Z4944* ("L"), *Z4954* ("V"), *Z4955* ("P"), *Z5087* ("N"), *Z5337* ("O"), *Z5674*.  
 No. 335 (Hellenic) Sqdn., R.A.F., Fuqa, 10/42: *Z5314* (trop. Mk. IIB).  
 No. 605 Sqdn., A.A.F., 1941: *Z4969*.  
 No. 680 (PR) Sqdn., Cyprus, 1944: *Z5132* (trop. P.R. Mk. II—high altitude aircraft).  
 No. 2 P.R.U., Middle East, 1942: *Z5132* (trop. P.R. Mk. II).

## THE HAWKER HURRICANE

No. 71 O.T.U., North Africa: *Z4924, Z4933, Z4964, Z5207, Z5261*.

Aircraft despatched to Russia, 1941–42 (other than those with Nos. 81 and 134 Sqdns.): *Z5159, Z5210–Z5213, Z5227 (FE-53), Z5236, Z5259, Z5262, Z5263, Z5480*.

Other Aircraft: *Z4866* (performance and handling trials, G.A.C. and A. & A.E.E.); *Z4867, Z4922, Z4931, Z5440* (later converted to Sea Hurricane Mk. IA and IB); *Z4993, Z5390* (miscellaneous trials, R.A.E., 1942–43).

**THE HAWKER HURRICANE MARK IIA, IIB AND IIC (GLOSTER-BUILT).** Fourth production batch of 449 aircraft built by Gloster Aircraft Co. Ltd., Brockworth, during 1941–42. Rolls-Royce Merlin XX engines. *BG674–BG723, BG737–BG771, BG783–BG832, BG844–BG888, BG901–BG920, BG933–BG977, BG990–BG999, BH115–BH154, BH167–BH201, BH215–BH264, BH277–BH296, BH312–BH360*. About 400 of these aircraft were scheduled for despatch to Russia; most of the remainder were sent to the Middle East as replacement aircraft.

No. 73 (F) Sqdn., Middle East, 1942; trop. N.F. Mk., IIC's: *BG750, BG751* (S/L Ward destroyed He 111K, 9/2/42), *BG867, BG877, BG902*.

No. 208 (AC) Sqdn., North Africa, 1942; trop. Tac R Mk. IIA's: *BG691, BG785, BG992, BG998* (missing Qattara Depression, 29/8/42).

No. 335 (Hellenic) Sqdn., R.A.F., Middle East, 10/42: *BG859*.

No. 607 Sqdn., A.A.F., Manston, 2/42: *BG946*.

**THE HAWKER HURRICANE MARK I (HAWKER-BUILT).** Third production batch of 500 aircraft (plus 30 replacements), built by Hawker Aircraft Ltd., Kingston, Brooklands and Langley, under Contract No. 962371/38. Rolls-Royce Merlin III engines. Metal-covered wings. *P3265–P3279, P3300–P3324, P3345–P3364, P3380–P3429, P3448–P3492, P3515–P3554, P3574–P3623, P3640–P3684, P3700–P3739, P3755–P3789, P3802–P3836, P3854–P3903, P3902–P3944, P3960–P3984*. Replacement machines: *P8809–P8818, R2680–R2689, T9519–T9538, W6667–W6670*. Deliveries commenced, 21/2/40; completed, 20/7/40. Average rate of production, about 3 aircraft per day.

No. 1 (F) Sqdn., Northolt, 7/40: *P3276* (destroyed Bf 109E over Tonbridge, 1/9/40), *P3318, P3395* (destroyed Bf 109E over Tonbridge, 1/9/40), *P3396, P3405, P3406* (destroyed Bf 109E over Tonbridge, 1/9/40), *P3471* (shot down, 19/7/40), *P3653, P3678, P3782* (missing 3/9/40); *P3886* (Kenley, 1/41).

No. 6 (F) Sqdn., 1941: *P3967*.

No. 17 (F) Sqdn., Martlesham Heath, 8/40: *P3468, P3482*.

No. 32 (F) Sqdn., Acklington, 10/40: *P3351, P3460*.

No. 43 (F) Sqdn., Wick, 1940: *P3468, P3531* (shot down off Shoreham, 19/7/40), *P3964, P3971*.

No. 46 (F) Sqdn., Sherburn-in-Elmet, 4/41: *P3309, P3597, R2684*.

No. 56 (F) Sqdn., 1940: *P3356, P3384, P3399, P3421, P3473, P3474, P3478, P3479, P3515, P3547, P3554, P3579, P3587, P3612, P3702, P3784, P3787, P3855, P3866, P3870, P3874, P3879, P3902*.

No. 73 (F) Sqdn., Gaye and Le Mans, France, 6/40: *P3351, P3456; Tobruk, 8/41: T9536*.

No. 85 (F) Sqdn., 1940: *P3407, P3408*.

No. 87 (F) Sqdn., 1940: *P3593 ("O"), P3755 ("Z")*.

No. 111 (F) Sqdn., North Weald, 6/40: *P3399, P3459, P3470, P3524, P3548, P3595, P3663, P3671* (missing, 10/7/40), *P3942, P3943, P3944* (missing, 15/8/40).

No. 208 (AC) Sqdn., El Khanka, Egypt, 11/41: *P3270, P3826* (2-camera Tac R Mk. I, Gambut, 1/41), *T9536* (abandoned on L.G.134, near Sollum, 18/10/41; recaptured, 5/42).

No. 249 (F) Sqdn., Boscombe Down, 8/40: *P3525, P3576* (shot down by Bf 110 over Southampton, 16/8/40; Bf 110 also destroyed and Hurricane pilot, F/L Nicholson, wounded, awarded V.C.), *P3579, P3594, P3616* (shot down in above combat, 16/8/40; pilot, P/O King, killed).

No. 253 (F) Sqdn., 9/40: *R2686* (in action over Brooklands, 4/9/40).

No. 257 (F) Sqdn., Northolt, 8/40: *P3412, P3578* (shot down, 3/9/40), *P3642, P3643, P3704, P3705 ("B"), P3706, P3707, P3708* (P/O Henderson shot down (but safe) after destroying two Bf 110's near Clacton, 31/8/40), *P3709, P3775, P3893*.

No. 274 (F) Sqdn., Sidi Haneish, 11/40: *P3729, P3821, P3822, P3977, P3980*.

No. 501 Sqdn., A.A.F., 7/40: *P3397, P3411, P3582, P3604, P3646, P3679, P3803, P3808, P3901*.

No. 504 Sqdn., A.A.F., Hendon; following aircraft intercepted raid on London, 15/9/40: *P3388, P3414, P3415, P3614, P3774*.

Aircraft damaged in action: *P3405, P3451, P3489, P3521, P3530, P3780, P3786* (repaired by Rollasons, 1940); *P3829* (repaired by Glosters); *P3924* (repaired by de Havillands).

Other Aircraft: *P3265* (performance trials, Brooklands, 1940); *P3269* (prototype Hurricane Mk. II with Merlin XX; tests with rear view hood, Brooklands, 1941; delivered as ground instruction machine, No. 3 S. of T.T., 12/10/42); *P3345* (tests with various paint schemes until 25/5/40); *P3416, P3898* (No. 9 (P) A.F.U. *P3416* was supplied to Eire, 12/43, as *108*); *P3462* (tests with long range fuel tanks); *P3463, P3524, P3886* (No. 59 O.T.U.); *P3458, P3549* (No. 55 O.T.U.); *P3620* (later converted to Sea Hurricane Mk. IA by General Aircraft Ltd.); *P3641* (radio trials, T.R.E. Malvern, 1941); *P3705, P3723, P3977* (trop. Mk. I's; No. 103 M.U., North Africa); *P3715* (No. 17 (P) A.F.U.); *P3720* (shipped to Iran as No. 252); *P3736* (fuel consumption trials, H.A.L.); *P3811* (trial 12-gun wing; also used for aircrew trials); *P3820, P3823* (engine handling trials, H.A.L.); *P3830* (trials to improve rearward vision, H.A.L.); *P3923* (propeller handling trials, H.A.L.); *P3967, P3970* (trop. Mk. I's; Ferry Pool, Takoradi, 1940); *P3702, P3715, P3881* (No. 4 (C) F.P.P. (Ferry Pool), June 1940).

# PRODUCTION DETAILS AND SERVICE ALLOCATION

**THE HAWKER HURRICANE MARK I (HAWKER-BUILT).** Fourth production batch of 500 aircraft, built by Hawker Aircraft Ltd., Kingston, Langley and Brooklands, during 1940-41, under Contract No. 62305/39. Rolls-Royce Merlin III engines. V7200-V7209, V7221-V7260, V7276-V7318, V7337-V7386, V7400-V7446, V7461-V7510, V7533-V7572, V7588-V7627, V7644-V7690, V7705-V7737, V7741-V7780, V7795-V7838, V7851-V7862, AS987-AS990. Deliveries commenced, 2/7/40; completed, 5/2/41. Average rate of production, approximately 4 aircraft per day.

No. 1 (F) Sqdn., North Weald, 9/40: V7256 (destroyed Bf 109E over Tonbridge, 1/9/40), V7258, V7301, V7302, V7376, V7377, V7379; Wittering, 10/40: V7464; Kenley, 1/41: V7534.

No. 32 (F) Sqdn., Acklington, 10/40: V7425.

No. 43 (F) Sqdn., 8/40: V7257.

No. 46 (F) Sqdn., Digby, 1/41: V7232, V7443 (missing from combat over Calais, 10/2/41); Sherburn-in-Elmet, 4/41: V7603.

No. 56 (F) Sqdn., 1940: V7315, V7340, V7342, V7352.

No. 73 (F) Sqdn., Debden and Hornchurch, 10/40: V7501, V7502; Sidi Haneish and Bu Amoud, 3/41: V7353 (S/Lt. Littolff destroyed Bf 109E over Tobruk harbour, 22/4/41); V7372, V7491, V7492, V7545, V7546, V7550, V7559, V7561, V7716, V7757, V7822; Mersa Matruh, 5/41: AS987, AS990.

No. 87 (F) Sqdn., 1941: V7646 ("R").

No. 111 (F) Sqdn., 10/40: V7361, V7400.

No. 208 (AC) Sqdn., Middle East; trop. Tac R Mk. I's; V7295 (Hafaya, 12/40), V7431 (El Khanka, Egypt, 10/41), V7772 (Tmimi, 1/42).

No. 213 (F) Sqdn., Cyprus, 6/41: AS987.

No. 249 (F) Sqdn., 1940: V7313 (in action over Brooklands, 4/9/40).

No. 257 (F) Sqdn., North Weald, 10/40: V7296 (P/O Pniak destroyed BR20, 11/11/40); V7298 (shot down, 12/10/40), V7351, V7607 (P/O Davey destroyed BR20, 11/11/40); 1/41: V7248, V7667.

No. 274 (F) Sqdn., Western Desert, 5/41: V7354, V7717, V7763, V7820 (shot down at Mersa Matruh, 12/5/41; F/O English missing).

No. 335 (Hellenic) Sqdn., R.A.F., Middle East, 1942: V7547.

No. 501 Sqdn., A.A.F., 1941: V7230 ("F"), V7368.

No. 601 Sqdn., A.A.F., 1941: V7238, V7291, V7411.

No. 2 P.R.U., Middle East; 2-camera trop. P.R.

Mk. I's, engaged in photography of Syria, 6/41; based at Heliopolis, Egypt: V7423, V7428.

Aircraft delivered to R.A.F. Abbotsinch, 1/2/41: V7856, V7858-V7862, AS989, AS990 (last Hawker-built Mk. I delivered to R.A.F.).

Other Aircraft: V7249 (de-icing trials, H.A.L., 7/40); V7260 (trial installation of four 20-mm. gun armament, 7/40); V7338 (Silloth Stn. Flt.); V7299, V7477, V7482 (at Takoradi, 12/40, en route for Middle East); V7366, V7462 (No. 59 O.T.U., 12/43); V7480 (miscellaneous Boscombe Down trials, from 25/3/41); V7504 (converted to catapult aircraft; Speke, 14/3/42); V7540 (supplied to Eire,

7/43, as 105); V7670 (captured intact by Germans, March 1941; recaptured on Gambut airfield later).

**THE HAWKER HURRICANE MARK II (HAWKER-BUILT).** Fifth production batch of 1,000 aircraft built by Hawker Aircraft Ltd., Kingston, Langley and Brooklands, during 1940-41, under Contract No. 62305/39. Rolls-Royce Merlin XX engines. Z2308-Z2357, Z2382-Z2426, Z2446-Z2465, Z2479-Z2528, Z2560-Z2594, Z2624-Z2643, Z2661-Z2705, Z2741-Z2775, Z2791-Z2840, Z2882-Z2931, Z2959-Z2993, Z3017-Z3036, Z3050-Z3099, Z3143-Z3187, Z3221-Z3270, Z3310-Z3359, Z3385-Z3404, Z3431-Z3470, Z3489-Z3523, Z3554-Z3598, Z3642-Z3691, Z3740-Z3784, Z3826-Z3845, Z3885-Z3919, Z3969-Z4018. Deliveries commenced, 14/1/41; completed, 28/7/41. Average rate of production, 5 aircraft per day.

No. 1 (F) Sqdn., Hawkinge (convoy patrols), 3/41; Mk. IIB's: Z2390, Z2457, Z2482, Z2484, Z2501, Z2628, Z2687, Z2690, Z2746, Z2759, Z2764, Z2802, Z2807, Z2810. Tangmere (Turbinlite and convoy patrols), 7/41; N.F. Mk. IIC's: Z3165, Z3341, Z3355, Z3595, Z3774 (missing from attacks on destroyers in Scharnhorst and Gneisenau operation, 12/2/42), Z3778 ("Y"), Z3826 ("O"), Z3841-Z3844, Z3884 (returned to H.A.L., Langley, 2/10/41, but crashed on landing), Z3897 ("N"), Z3899 (collided with BD940, 22/11/41, over Isle of Wight), Z3902, Z3903, Z3970 (took part in attack on Scharnhorst destroyer escort, 12/2/42), Z3987.

No. 3 (F) Sqdn., 1941: Z2891, Z3025 ("C"), Z3069 ("F"), Z3086 ("P"), Z3894 ("R").

No. 17 (F) Sqdn.: Z2801 ("S").

No. 56 (F) Sqdn., 1941: Z2355 ("L"), Z2405, Z2448 ("V"), Z2449 ("M"), Z2572, Z2573, Z2575 ("L"), Z2585, Z2586 ("P"), Z2587, Z2635, Z2636 ("U"), Z2664 ("O"), Z2674 ("M"), Z2677 ("N"), Z2688 ("S"), Z2697, Z2702, Z2755, Z2763, Z2767, Z2769 ("W").

No. 66 (F) Sqdn., 1941: Z2317 ("L"), Z2318 ("E"), Z2327 ("T").

No. 79 (F) Sqdn., 1941; Mk. IIB's: Z2633, Z2674, Z3151 ("F"), Z3156 ("H"), Z3745 ("B").

No. 81 (F) Sqdn., Vaenga, North Russia, 9/41: Z3746 (Sgt. N. Smith killed in action, 12/9/41), Z4006, Z4010, Z4017, Z4018.

No. 87 (F) Sqdn., 1941: Z3775, Z3778 ("P"), Z3779 ("Y"), Z3915 ("G"), Z3992.

No. 134 (F) Sqdn., Vaenga, North Russia, 9/41: Z3763, Z3768 (FK-49), Z3976, Z3977 (FK-55).

No. 208 (AC) Sqdn., Middle East, 1942: Z2328 (trop. P.R. Mk. IIA; shot down, 28/7/42).

No. 213 (F) Sqdn., 1942: Z3514.

No. 253 (F) Sqdn., 1941-42: Z3171 ("P"), Z3971 (Mk. IIC).

No. 257 (F) Sqdn., 2/41; Mk. IIA: Z2687; 8/41, Mk. IIB's: Z2343, Z2907, Z2926, Z3025, Z3164, Z3322, Z3387, Z3380, Z3511, Z3516, Z3744, Z3782; 8/41, Mk. IIC's: Z3051, Z3088.

No. 601 Sqdn., A.A.F., 1941: Z3257 ("A"), Z3744 ("P").

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Aircraft damaged in action and repaired by Rosenfields Ltd.: Z2484, Z2489, Z2515, Z2565; Repaired by Rollasons: Z2970.

Presentation aircraft: Z2661–Z2705 (Z2705—“Bahamas”); Z2791–Z2840 (Z2840—“McConnell’s Squadron”); Z2882–Z2931 (Z2899—“McConnell’s Squadron”).

Boscombe Down Trials Aircraft: Z2320/G, Z3092/G (R.P. trials, 4/41); Z2326 (Rolls-Royce B.F. and Vickers “S” 40-mm. guns, 1941–42); Z2346 (cockpit heating trials); Z2461 (hood jettisoning trials, 9/2/41); Z2885 (four 20-mm. Hispano guns, 9/3/41); Z2895 (modified fuel system); Z2905 (T.I. of 90-gallon ferry tanks on 4-cannon wing, 13/3/41); Z3157 (8-gun tests); Z3451 (miscellaneous trials, 5/41); Z3564 (armament trials, Mk. IIB; 14/6/41); Z3888 (T.I.’s for Mk. IIC, 2/7/41 and 4/1/42).

Other aircraft: Z2308 (air intake and performance trials, H.A.L.); Z2326 (external store trials, H.A.L.); Z2399 (tests with modified oil cooler, H.A.L.); Z2415 (high altitude trials, H.A.L., 12/40); Z2457, Z2691 (miscellaneous trials, R.A.E., 1942); Z2589 (company T.I.’s on Mk. IIC wing, H.A.L., 31/1/41); Z2340 (not delivered; cannibalised for spares); Z2795 (radio trials, T.R.E., Malvern); Z2832 (force landing in Eire, 1943. Temporarily registered 94 in I.A.C.; returned to R.A.F., 7/43); Z2903, Z3036, Z3056, Z3058 (Stn. Flt., Northolt); Z3067 (damaged during tests; delivery delayed until 24/3/41); Z3078 (crashed during delivery, 23/3/41; subsequently repaired); Z3179 (to G.A.C., 6/4/41, for development flying); Z3249 (damaged during test; delivery delayed until 30/4/41); Z3682 (remnants stored at Waterbeach, 1953, and used for spare parts for LF363); Z3687 (fitted with low-drag A.W.A. wing, 1946–47); Z3919 (R.A.E. trials with R.P.’s); Z3981 (miscellaneous trials, H.A.L., 7/41–8/41); Z4015 (Mark IIB, later converted to Sea Hurricane Mk. IC).

**THE HAWKER HURRICANE MARK II (HAWKER-BUILT).** Sixth production batch of 1,350 aircraft built by Hawker Aircraft Ltd., Kingston, Langley and Brooklands, during 1941–42. Rolls-Royce Merlin XX engines. BD696–BD745, BD759–BD793, BD818–BD837, BD855–BD899, BD914–BD963, BD980–BD986, BE105–BE117, BE130–BE174, BE193–BE242, BE274–BE308, BE323–BE372, BE394–BE428, BE468–BE517, BE546–BE590, BE632–BE651, BE667–BE716, BM898–BM936, BM947–BM996, BN103–BN142, BN155–BN189, BN203–BN242, BN265–BN298, BN311–BN337, BN346–BN389, BN399–BN435, BN449–BN497, BN512–BN547, BN559–BN603, BN624–BN654, BN667–BN705, BN719–BN759, BN773–BN802, BN818–BN846, BN859–BN882, BN896–BN940, BN953–BN987. Deliveries commenced 24/7/41, completed, 18/3/42. Average rate of production, 6 aircraft per day.

No. 1 (F) Sqdn., Tangmere, 2/42. Intruder operations; N.F. Mk. IIC’s: BD770, BD935, BD937, BD940

(collided with Z3899 over Isle of Wight, 22/11/41), BD945–BD947; BD949, BD950, BD983, BE150, BE215 (in action against *Scharnhorst* and *Gneisenau*, 12/2/42) BD949 (lost); BE670 (“Y”), BN205, BN232, BN373, BN969 (“S”).

No. 3 (F) Sqdn., Mk. IIC’s, 1942: BD696, BD836, BD860 (“Y”), BD867 (“W”), BD868 (“P”), BD893 (“G”), BD948 (“X”), BD982 (“L”), BE116 BN185 (“B”), BN188 (“A”).

No. 6 (F) Sqdn., Helwan and El Adem, 6/42; tropical Mk. IIC’s: BN677, BN797, BN841, BN842, BN845, BN846, BN860 (in action at Bir Hakim, 6/42).

No. 17 (F) Sqdn., Burma; tropical Mk. IIC’s: BN462, BN463.

No. 43 (F) Sqdn., Acklington; Turbinlite patrols, 2/42; N.F. Mk. IIC’s: BD715, BD717, BD762, BD863; Tangmere, Intruder N.F. Mk. IIC’s: BN229, BN230, BN234, BN235.

No. 73 (F) Sqdn., Middle East, 2/42; tropical Mk. IIB’s: BD774, BD782, BD887, BD916, BD920, BD930 (“R”), BD931, BD957 (flown by F/L Johnston, destroyed Bf 109F, 9/2/42), BE169; tropical N.F. Mk. IIC’s: BE231, BE372, BE557, BM967, BM975 (“G”), BN115, BN121 (shot down 17/6/42), BN131, BN155, BN156, BN157 (shot down 17/6/42), BN277 (missing with S/L Ward, 17/6/42); Heliopolis, 6/42, tropical N.F. Mk. IIC’s: BN410, BN415, BN538 (shot down over Cairo, 29/8/42; pilot safe); BN560 (missing, 16/6/42), BN649 (missing, 17/6/42).

No. 79 (F) Sqdn., Burma; tropical Mk. IIC: BN596.

No. 80 (F) Sqdn., El Alamein, L.G.92, 8/42; tropical Tac R Mk. IIC’s: BE395, BN351, BN355.

No. 81 (F) Sqdn., Vaenga, North Russia, 9/41; Mk. IIB’s: BD697, BD792, BD822.

No. 87 (F) Sqdn., Mk. IIC: BE508 (“A”).

No. 128 (F) Sqdn., Mk. IIC: BE673 (“M”).

No. 134 (F) Sqdn., Vaenga, North Russia, 9/41; Mk. IIB: BD825 (crashed, 27/9/41, with two airmen on tail; both killed).

No. 174 (F) Sqdn., N.F. Mk. IIC’s: BE421 (“G”), BE684, BN795 (Mk. IIB; presentation aircraft in memory of S/L John Gillan).

No. 175 (F) Sqdn., Warmwell, 1942; Mk. IIB fighter-bombers: BE417, BE419, BE482 (“T”), BE485, BE486, BE492, BE503, BE650, BE687; attacked and sank three E-boats in English Channel, 15/5/42: BE301, BE478, BE484, BE489, BE667, BE668, BE690.

No. 208 (AC) Sqdn., Middle East, 1942; tropical Tac R Mk. IIA’s: BE567 (missing, 24/8/42), BN127 (missing with F/O Eshelby, 2/11/42); tropical P.R. Mk. IIA: BE709 (shot down at Burg-el-Arab, 28/9/42); tropical Tac R Mk. IIC’s: BD793, BN156 (missing, 24/8/42).

No. 213 (F) Sqdn., Middle East, 1942; tropical Mk. IIC’s: BE200 (“M”), BE340 (“W”), BE355 (“Q”), BE569 (“P”), BE643 (“U”), BE701 (“S”), BE702 (“V”); motor patrols from El Gamil, 6/43: BM966 (“T”), BM974, BN117 (“X”), BN132 (“X”), BN133 (“Y”), BN134 (“Z”), BN136 (“S”),

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- BN137, BN159 ("J"), BN184 ("W"), BN231 ("Y"), BN285 ("M"), BN286 ("O"), BN354 ("S"), BN368 ("Z").*
- No. 229 (F) Sqdn., Mk. IIC: *BD696.*
- No. 239 (F) Sqdn., Mk. IIC's: *BN373, BN411, BN864, BN966.*
- No. 242 (F) Sqdn., tropical Mk. IIB's: *BE402, BE565.*
- No. 247 (F) Sqdn., Mk. IIC: *BD936 ("S").*
- No. 335 (Hellenic) Sqdn., R.A.F., Middle East, 10/42: *BE681 (trop. Mk. IIB).*
- No. 402 Sqdn., R.C.A.F., Southend; bomber escorts, 8/41; Mk. IIB's: *BD707, BD712* (missing from Dieppe raid, 19/8/42), *BD764, BD765*; offensive sweeps, 9/41; Mk. IIB fighter-bombers: *BE221, BE417 ("K"), BE419, BE424, BE426, BE470-BE473, BE477 ("S"), BE478, BE479, BE483, BE484, BE485 ("W"), BE486, BE488, BE489, BE492, BE502.*
- No. 451 Sqdn., R.A.A.F., Cyprus and Alexandria, 1942-43; F.R. patrols, tropical Mk. IIC's: *BD779, BN114, BN115, BN290, BN356, BN518* (crashed into sea off Alexandria, 19/5/43; pilot safe); Idku, 1/43: *BN404.*
- No. 601 Sqdn., A.A.F., Mk. IIC's: *BD712.*
- No. 607 Sqdn., A.A.F., Martlesham Heath, 12/41; Mk. IIC's: *BE222, BE394, BE397, BE398, BE400, BE401, BE403-BE405, BE418, BE420-BE423, BE425, BE474-BE476*; Manston, 4/42: *BM948, BN163.*
- No. 41 Sqdn., S.A.A.F., Aksum and Debarec, Abyssinia, 11/42; tropical Mk. IIB: *BE667.*
- No. 1413 (Meteorological) Flt., Rayak, Damascus, Aqir and Lydda, 1943-45; Met. Mk. IIC: *BN974.*
- No. 1414 (Meteorological) Flt., Mogadishu and Eastleigh, East Africa, 1943-45; Met. Mk. IIC: *BN347.*
- No. 1415 (Meteorological) Flt., Habbaniyah, 1943-45; Met. Mk. IIC: *BE487.*
- Aircraft shipped to Russia, 1942; Mk. IIB's: *BD709, BD731, BD956, BD959, BE470, BN416, BN471, BN481*; Mk. IIC's: *BE162* (converted from Mk. IIB), *BN428.*
- Other aircraft: *BD772, BD916, BE157, BE167, BE227, BN837* (tropical Mk. IIB's and IIC's; No. 103 M.U., North Africa, 1942): *BD787* (later converted to Sea Hurricane Mk. IA); *BE173/G* (retained by H.A.L. at Langley for miscellaneous armament trials); *BE329, BE494, BN627, BN961* (tropical Mk. IIB's of No. 71 O.T.U., North Africa, 1943); *BE711* (to Rolls-Royce Ltd., for trials, 1942); *BN114/G, BN526/G, BN571/G* (armament trials at A. & A.E.E. from 1942); *BN635* (to Field Consolidated Aircraft Services, Hanworth, 5/4/42); *BN878* (to T.R.E., Malvern, for radio trials).
- THE HAWKER HURRICANE MARKS II AND IV (HAWKER-BUILT).** Seventh production batch of 1,888 aircraft built by Hawker Aircraft Ltd., Kingston and Langley, during 1942. Contract No. 62305/39/B, Parts 1-9. *BN988-BN992, BP109-BP141, BP154-BP200, BP217-BP245, BP259-BP302, BP316-BP362, BP378-BP416, BP430-BP479, BP493-BP526, BP538-BP566, BP579-BP614, BP628-BP675, BP692-BP711, BP734-BP772, HL544-HL591, HL603-HL634, HL654-HL683, HL698-HL747, HL767-HL809, HL828-HL868, HL879-HL913, HL925-HL941, HL953-HL997, HM110-HM157, HV275-HV317, HV333-HV370, HV396-HV445, HV468-HV516, HV534-HV560, HV577-HV612, HV634-HV674, HV696-HV745, HV768-HV799, HV815-HV858, HV873-HV921, HV943-HV989, HW115-HW146, HW167-HW207, HW229-HW278, HW291-HW323, HW345-HW373, HW399-HW444, HW467-HW501, HW533-HW572, HW596-HW624, HW651-HW686, HW713-HW757, HW779-HW808, HW834-HW881.* Deliveries commenced, 17/3/42; completed, 23/11/42. Average rate of production, 8 aircraft per day.
- No. 1 (F) Sqdn., Tangmere, 6/42; intruder operations, N.F. Mk. IIC's: *HL589, HL603 ("I").*
- No. 6 (F) Sqdn., Mersa Metruh, 6/42; tropical Mk. IID's: *BP131, BP137, BP182 ("X"), BP188 ("Z"), BP326, BP550*; Heliopolis, 1/43; tropical Mk. IIC's: *HM118*; Castel Benito, 3/43; tropical Mk. IID's: *BP193 ("Z")*; following aircraft attacked heavy enemy armoured concentration at Zamlet El Hadid, 10/3/43: *HM595, HM597, HM663, HM672, HM876, HW271, HW298, HW303, HW439.*
- No. 17 (F) Sqdn., Burma, 1943; tropical Mk. IIC: *HV798.*
- No. 30 (F) Sqdn., Burma, 1943-44; tropical Mk. IIC's: *BP110, BP510 ("H").*
- No. 43 (F) Sqdn., Tangmere, 7/42; shipping strikes and sweeps; Intruder N.F. Mk. IIC's: *HL656, HL863* (missing from sweep over Fecamp, 26/7/42); following aircraft took part in combined operations at Dieppe, 19/8/42: *BP703, HL560, HL562, HL563.* North African landings; Maison Blanche airfield, 9/11/42; sweeps, convoy patrols and escorts; tropical Mk. IIC's: *HV399, HV402, HV403, HV406-HV409, HV417, HV536, HV541, HV580, HV740, HV817, HV970*; Algiers, 2/43: *HW122, HW137, HW197, HW204, HW421.*
- No. 73 (F) Sqdn., Heliopolis, Alexandria and L.G. 92, El Alamein, 8/42; tropical N.F. Mk. IIC's: *BP167* (destroyed Ju 88, Burg-El-Arab, 31/8/42), *BP175, BP177, BP186, BP287, BP344, BP380, BP398, BP518* (destroyed Ju 88, El Alamein, 31/8/42), *BP521, BP566, BP584, HL664, HL707, HL796, HL799, HL801, HL839, HL852, HL956, HM118, HM136, HV299, HV317, HV400, HV426, HV441, HV516, HV585, HV818.*
- No. 80 (F) Sqdn., L.G.92, El Alamein and El Bassa, Palestine, 8-9/42; Tac R and Anti-Tank Support; tropical Tac R Mk. IIC fighter-bombers: *BP337, BP340, BP414.*
- No. 113 (F) Sqdn., Burma, 1943-44; tropical Mk. IIB's: *HW666, HW881 ("X").*
- No. 174 (F) Sqdn., Manston, 1942; Intruder Mk. IIC's: *BP649, BP653, BP657, BP672*; 1943, Mk. IIB's: *HL705, HL715.*

## THE HAWKER HURRICANE



"Mohlomi"—an early presentation Hurricane IIC, BP352.

- No. 175 (F) Sqdn., Warmwell, 8/42; shipping strikes, Mk. IIB fighter-bombers: *HV506, HV555, HV844*; Harrowbeer, 10/42: *HL723, HL728, HW118, HW140*; Stoney Cross and Lasham, 3/43: *BP295, HW118, HW140*.
- No. 176 (F) Sqdn., Baigachi, East Bengal, 11/43; tropical N.F. IIC: *HW415* ("O").
- No. 208 (AC) Sqdn., Western Desert, 10/42; tropical Tac R Mk. IIB's: *BP604, BP610* (crashed during low flying, 16/1/43), *HL739, HL875*; tropical Tac R Mk. IIA's: *HL566, HL567, HL591*; Rayak and Habbaniyah, 1/43; tropical Tac R Mk. IIC's: *BP446, HL678*; El Bassa, Palestine, 11/43; *HL678, HL830, HL849, HL855*.
- No. 213 (F) Sqdn., El Alamein, 8/42; tropical Mk. IIC's: *BP123* ("S"), *BP128* ("W"), *BP189* ("S"), *BP219, BP231* ("Y"), *BP237* ("X"), *BP341* ("J"), *BP342, BP409, BP462* ("Z"), *BP515, BP580, BP581, BP592* (destroyed three Ju 88's over El Alamein, 1/9/42), *BP734*; El Gamil, 1-6/43; M.T. convoy patrols: *HL609, HL833, HL883* ("W"), *HL887, HL941* ("V"), *HM131* ("Y"), *HV305, HV315, HV440* ("U"), *HV468* ("P"), *HV474, HV483, HV511, HV539* ("T"), *HV587* ("N"), *HV609* ("S"), *HV712, HV830, HW571, HW800*.
- No. 237 (F) Sqdn., Middle East, 1942; tropical Mk. IIC's: *BP359* ("P"), *BP397* ("J"), *HL735, HL844, HL851, HL859*.
- No. 239 (F) Sqdn., 1942, Mk. IIC's: *BP359* ("P"), *BP389, BP397*.
- No. 274 (F) Sqdn., Western Desert, 1942; tropical Mk. IIA fighter-bomber: *HL795* ("V").
- No. 335 (Hellenic) Sqdn., R.A.F., Middle East; tropical Mk. IIB's: in action over Fuqa and Daba, 10/42: *BP279, BP290, BP317*; in action over Avacado, 7/43: *HL599, HL785, HL834*.
- No. 451 Sqdn., R.A.A.F., Mersa Matruh, 1/43; interception duties, tropical Mk. IIC's: *HL805, HL835, HL965, HV843*; Idku, 3/43: *BP342, HL611, HV294, HW538, HW404*.
- No. 527 (Calibration) Sqdn., Hornchurch, 10/43; various Mk. II's: *BP672, BP737, HW206, HW207* (used for calibration of East Coast radar, 1944-46; also Continental mobile radar, 1945).
- No. 607 Sqdn., A.A.F., Manston, 1942; Channel sweeps with Mk. IIB fighter-bombers: *HL867, HM110, HV428, HV437, HV652, HW270, HW489*; Mk. IIC fighter-bomber: *HV947*.
- No. 615 Sqdn., A.A.F., Far East, 1944; tropical Mk. IIC: *HV828*.
- No. 680 (PR) Sqdn., Tocra, Libya, 7-10/44; tropical P.R. Mk. IIC's: *HV295, HV479, HW663* (used for communications).
- No. 1413 (Meteorological) Flt., Lydda, 3/44-10/45; tropical Met. Mk. IIC's: *BP224, BP288, BP391, HL790, HV711*.
- No. 1414 (Meteorological) Flt., Mogadishu and Eastleigh, East Africa, 9/43-7/45; tropical Met. Mk. IIC's: *HV370, HV500, HV583, HV608, HV780*.
- No. 1415 (Meteorological) Flt., Habbaniyah, 9/43-11/45; tropical Met. Mk. IIC's: *BP446, BP763, HV609, HV890*.
- No. 41 Sqdn., S.A.A.F., Bu Amoud, 8/43; tropical Mk. IIB fighter-bombers: *HV480, HV490, HV796, HV911*.
- No. 71 O.T.U., North Africa, 1942-43; tropical Mk. IIB's: *BP606, HL612, HL628, HL706, HL934, HV369, HV581, HV664, HV673, HV837, HV853, HV854, HV857, HV911, HW659*.
- Aircraft shipped to Russia (some from the Middle East), 1943; Mk. IIB fighter-bombers: *BP657* (converted from Mk. IIC), *HL629, HL992, HL994, HV362, HV364, HV840, HV844, HV880, HW117, HW143, HW233, HW347, HW364, HW471, HW551, HW552, HW557, HW571*; Mk. IIC fighter-bombers: *HL549, HL665* (converted to two-seater by Russians, 1943), *HV279, HV287, HV293, HV556, HV593, HW168, HW205, HW300, HW357, HW371, HW406, HW715, HW868, HW872, HW879*; tropical Mk. IID: *HW686*.
- Aircraft supplied to Turkey from Middle East stocks, 10-11/42; tropical Mk. IIC's: *HV513, HV551, HV608*.
- Other aircraft: *BP173* (also *BP173/G*; built as Mk. IIB and delivered to No. 47 M.U., Sealand, 1/4/42; returned to H.A.L. and modified to Mark IV; thence to A. & A.E.E., 29/7/42 for trials); *BP734* (to No. 1



"Kenya Weekly News"—a presentation Hurricane IV, BP452.

## PRODUCTION DETAILS AND SERVICE ALLOCATION



"Swaziland II"—a late-series presentation Hurricane IV, HW660. Swaziland also contributed money for Typhoons.

F.T. Flt., Lyneham, 24/6/42, before despatch to the Middle East; *HL673* (later converted to Sea Hurricane (Tropical) Mk. IC); *HL706-HL714* (Mk. IIB's to No. 1 F.T. Flight, Lyneham, 4/6/42. *HL707* was badly damaged during delivery but was repaired and re-delivered, 4/7/42; some aircraft were later despatched to the Middle East); *HV366* (tropical Mk. IIC used by Cranwell Stn. Flt., 1942-43); *HV559* (tropical Mk. IIB to A.F.T.U., India, 1944); *HV722* (No. 231 Group Communications Flight, 1944); *HW115* (production oil system check, 9/42); *HW182/G* (to A. & A.E.E. for armament trials, 15/10/42); *HW187* (also *HW187/G*; to A. & A.E.E. for armament trials, 12/10/42); *HW203* (trials with H.A.L. with drop tanks on universal wings, 9/42); *HW366* (tropical Mk. IIB to T.S.T.U., India, 1943-44); *HW747* (trials at A. & A.E.E., from 24/12/42).

**THE HAWKER HURRICANE MARKS II AND IV (HAWKER-BUILT).** Eighth production batch of 1,200 aircraft built by Hawker Aircraft Ltd., Kingston and Langley, during 1942-43. Contract No. 62305/39/C, Parts 1-6. *KW696-KW731*, *KW745-KW777*, *KW791-KW832*, *KW846-KW881*, *KW893-KW936*, *KW949-KW982*, *KX101-KX146*, *KX162-KX202*, *KX220-KX261*, *KX280-KX307*, *KX321-KX369*, *KX382-KX425*, *KX452-KX491*, *KX521-KX567*, *KX579-KX621*, *KX691-KX736*, *KX749-KX784*, *KX796-KX838*, *KX851-KX892*, *KX922-KX967*, *KZ111-KZ156*, *KZ169-KZ201*, *KZ216-KZ250*, *KZ266-KZ301*, *KZ319-KZ356*, *KZ370-KZ412*, *KZ424-KZ470*, *KZ483-KZ526*, *KZ540-KZ582*, *KZ597-KZ612*. Also Sea Hurricane Mk. IIC conversions, *NF668-NF703*. Deliveries commenced, 20/11/42; completed 19/4/43. Average rate of production, slightly more than 8 aircraft per day.

No. 6 (F) Sqdn., Grottaglie, Italy, 3/44; tropical Mk. IV's with anti-tank guns: *KW716* ("A"), *KX178* ("P"), *KX805* ("V"), *KX826* ("R"), *KX885* ("Z"); 4/44, tropical Mk. IV's with R.P.'s:

*KZ187* ("X"), *KZ188* ("E" and "C"), *KZ321* ("N"); detached to Haifa, 12/43; mixed gun and R.P. armament: *KZ240* ("Y"); detached to Fayid, 12/43; mixed gun and R.P. armament: *KZ397*.

No. 113 (F) Sqdn., Burma, 1944; tropical Mk. IIB fighter-bomber: *KZ279*.

No. 137 (F) Sqdn., Milfield and Southend, 7/43; Mk. IV's with anti-tank guns and R.P.'s: *KZ399*, *KZ400*, *KZ620*, *KZ655*, *KZ676*, *KZ827*, *KZ829*; following aircraft took part in first Mk. IV Rhubarb with anti-tank guns, Belgium, 23/7/43; *KW918*, *KZ827*; following aircraft attacked and destroyed the Hansweert lock gates, Holland, 2/9/43, with R.P.'s: *KX585*, *KZ248*, *KZ396*, *KZ576* (missing with F/O J. L. De Houx).

No. 164 (F) Sqdn., Middle Wallop, 6/43; anti-shipping reconnaissance and sweeps, Mk. IV's: *KX413* ("H"), *KX540*, *KX541*, *KX702*, *KZ406*; Warmwell, 7/43; anti-shipping reconnaissance, Mk. IV's: *KX409*, *KX536*, *KX542*, *KZ193* ("O"); Manston, 8/43; Rhubarbs, Mk. IV's: *KX582*, *KX596*, *KX879*, *KZ480*; Fairlop, 9-10/43; intruder operations, N.F. Mk. IV's: *KW919*, *KZ405*, *KZ552*, *KZ609*.

No. 184 (F) Sqdn., Manston, 6-8/43; anti-shipping strikes; Mk. IV's with mixed anti-tank and R.P. armament: *KX401* ("G"), *KX407* ("A"), *KZ584* ("W"), *KX807* ("Q"), *KX884* ("T"), *KZ185* ("K"), *KZ188* ("E"), *KZ189* ("F"), *KZ193* ("X"), *KZ378* ("V"); missing from attack on shipping off Dutch coast, 28/6/43; *KZ554* ("S"), *KZ572* ("B"), *KZ579* ("Z"), *KZ606* ("L"), *KZ607* ("F"), *KZ611* ("B").

No. 213 (F) Sqdn., El Gamil, 6/43; M.T. convoy patrols, tropical Mk. IIC: *KZ130*.

No. 279 (F) Sqdn., 1943; Mk. IIC's: *KZ571*, *KZ576*.

No. 283 (F) Sqdn., 1943; Mk. IIC: *KW280*.

No. 288 Sqdn., 1943; Mk. IIC's: *KZ405* ("J"), *KZ576* ("P").

No. 335 (Hellenic) Sqdn., R.A.F. Middle East; shipping protection, 10/43, with tropical Mk. IIC's: *KZ130*, *KZ142*, *KZ335*, *KZ435*.



"Orissa VIII"—a late-series Hurricane IIC, *KW922*, with long range fuel tanks. Over two hundred British fighters were subscribed by Indian states.

## THE HAWKER HURRICANE



"British Prudence"—a late-series presentation Hurricane IIC, KW924, with long-range fuel tanks.

No. 451 Sqn., R.A.A.F., Middle East; interception duties at Idku, 3/43, with tropical Mk. IIC's: KZ115, KZ118, KZ446.

Sea Hurricane Mk. IIC conversions. The following aircraft were delayed for naval conversion at Langley; subsequent registration in brackets: KW770 (NF668), KW774 (NF671), KW791 (NF669), KW792 (NF670), KW799 (NF672), KW800 (NF673), KW804 (NF674), KW807 (NF677), KW808 (NF675), KW809 (NF678), KW810 (NF676), KW816 (NF679), KW817 (NF680), KW827 (NF681), KW828 (NF682), KW849 (NF683), KW850 (NF684), KW860 (NF685), KW862 (NF686), KW868 (NF687), KW870 (NF688), KW878 (NF689), KW880 (NF690), KW897 (NF691), KW899 (NF692), KW908 (NF693), KW909 (NF694), KW910 (NF695), KW911 (NF696), KW918 (NF697), KW919 (NF698), KW920 (NF699), KW921 (NF700), KW928 (NF701), KW929 (NF702), KW930 (NF703), Delivery, May 1943.

Aircraft shipped to Russia, 1943 (some from Middle East stocks). Mark IIC fighter-bombers: KW706, KW723, KX113, KX125 (fighter), KX137, KX538 (tropical), KX545 (tropical), KZ234; Mark IID's: KW777 (tropical), KX177 (tropical), KX181 (tropical), KZ301; Mk. IV's: KX813 (fighter), KX865 (anti-tank), KX888 (believed lost at sea); KZ509 (shipped as catapult Sea Hurricane Mk. IIC, but not used on voyage to Russia).

Other aircraft: KX180 (Mk. IV to A. & A.E.E. for R.P. trials); KX247 (tropical Mk. IV to A.F.T.U., India, 1944); KX405 (built as tropical Mk. IV; converted to Mk. V prototype standard with Merlin 32; trials at Langley and A. & A.E.E.); KX412 (comparative trials with KX405 with H.A.L., 2/43); KX700 (training aircraft, Mk. IIC; no guns); KX858, KX862 (Mk. IV T.I. aircraft, A. & A.E.E., 1943); KX877 (built as tropical Mk. IV; spent short time modified to Mk. V standard, H.A.L. and A. & A.E.E., 3/43); KZ138 (tropical Mk. IIB of No. 71 O.T.U., North Africa, 1944); KZ193 (prototype Hurricane Mk. V; later returned to Mk. IV standard); KZ232 (used for stability trials, H.A.L.

and A. & A.E.E., 1943); KZ352 (tropical Mk. IIC to G.A.T.U., India, 6/45); KZ466 (performance trials, H.A.L., 4/43); KZ569 (to T.S.T.U., India, 1944-45).

## THE HAWKER HURRICANE MARKS II AND IV

(HAWKER-BUILT). Ninth production batch of 1,205 aircraft built by Hawker Aircraft Ltd., Kingston and Langley, during 1943. Contract No. 62305/39/C Parts 7-12. KZ613-KZ632, KZ646-KZ689, KZ702-KZ750, KZ766-KZ801, KZ817-KZ862, KZ877-KZ920, KZ933-KZ949, LA101-LA144, LB542-LB575, LB588-LB624, LB639-LB687, LB707-LB744, LB769-LB801, LB827-LB862, LB873-LB913, LB927-LB973, LB986-LD131, LD157-LD185, LD199-LD219, LD232-LD266, LD287-LD315, LD334-LD351, LD369-LD416, LD435-LD470, LD487-LD508, LD524-LD539, LD557-LD580, LD594-LD632, LD651-LD695, LD723-LD749, LD772-LD809, LD827-LD866, LD885-LD905, LD931-LD979, LD993-LD999. Deliveries commenced 18/4/43; completed 29/9/43. Average rate of production, slightly more than 7 aircraft per day.

No. 6 (F) Sqn., tropical Mk. IV's with R.P.'s; Grottaglie, Italy, 4/44: LB649 ("T"); Falconara, Sardinia, 10/44: LB774 ("E"), LD162 ("B"), LD168 ("N").

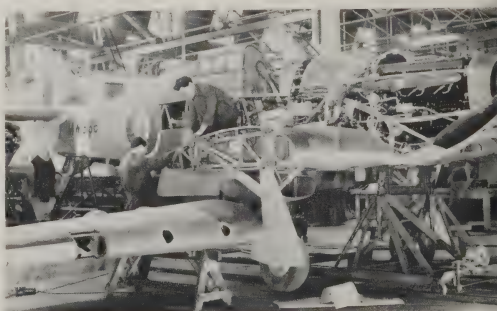
No. 28 (F) Sqn., Burma, 1944; tropical Mk. IIB fighter-bomber: LD172.

No. 113 (F) Sqn., Burma, 1944; tropical Mk. IIB fighter-bombers: LB551, LD667 ("C").

No. 137 (F) Sqn., Southend, 7/43; Mk. IV's with anti-tank guns and R.P.'s: KZ620, KZ655, KZ676, KZ827, KZ829; following aircraft took part in first Mk. IV Rhubarb with anti-tank guns, Belgium, 23/7/43: KZ661, KZ662.

No. 164 (F) Sqn., Fairlop, 9-10/43; intruder operations, N.F. Mk. IV's: KZ708, KZ912.

No. 184 (F) Sqn., Manston, 8/43; anti-shipping strikes; Mk. IV's with mixed anti-tank and R.P. armament: KZ678 ("D"), KZ703 ("H"), KZ715 ("N"), KZ918.



A Hurricane IIC nearing the end of the production line at the Langley factory.

No. 438 Sqdn., R.C.A.F., Hurn, 1944; Mk. IV: *LD973* ("O").

No. 439 Sqdn., R.C.A.F., Wellingore and Hurn, 3/44; Mk. IV's: *LD570*, *LD972* (collided with Thunderbolt fighter, 21/3/44).

No. 451 Sqdn., R.A.A.F.; interception duties at Idku, 10/43, with Mk. IV's: *LB938*, *LB939*.

No. 607 Sqdn., A.A.F., Far East, 1944; tropical Mk. IIC fighter-bomber: *KZ724* ("S"); tropical Mk. IV fighter-bomber: *KZ729*.

No. 10 Sqdn., I.A.F., India and Burma, 1944; tropical Mk. IIC: *LB732*; tropical Mk. IV's: *LB602*, *LB664*.

No. 1344 Flt.; tropical Mk. IIC's: *HZ710*, *LB734*.

No. 1415 (Meteorological) Flt., Habbaniyah, 1945; tropical Met. Mk. IIC: *LD109*.

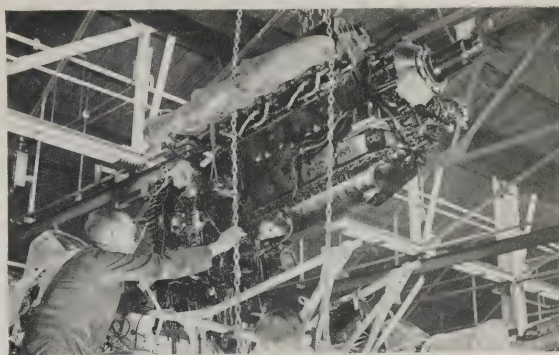
Aircraft shipped to Russia, 1943-44; Mk. IIC Fighters: *LB858*, *LD205*; Mk. IIC fighter-bomber: *LB991*.

No. 71 O.T.U., Middle East, 1944; *KZ819* (tropical Mk. IIC), *LB675* (tropical Mk. IIB).

No. 73 O.T.U., 1944; Mk. II target tugs: *LB891*, *LB893*.

Other aircraft: *KZ679* (also as *KZ679/G*, to A. & A.E.E. for R.P. trials); *LB771* (later Ground Instruction Machine 4628M); *LD182* (crashed during test, 16/7/43; deposited at Premier Garage, Bath Road, Slough, 13/9/43); *LD264*, *LD438*, *LD439* (to A. & A.E.E. for trials, 23/7/43); *LD412* (tropical Mk. IV to G.A.T.U., India, 1944); *LD621* (damaged in forced landing during flight testing, 25/8/43).

**THE HAWKER HURRICANE MARKS II AND IV (HAWKER-BUILT).** Tenth production batch of 1,357 aircraft built by Hawker Aircraft Ltd., Kingston and Langley during 1943-44. Contract No. 62305/39/C, Parts 13-19. *LE121-LE146*, *LE163-LE183*, *LE201-LE214*, *LE247-LE273*, *LE291-LE309*, *LE334-LE368*, *LE387-LE405*, *LE432-LE449*, *LE456-LE484*, *LE499-LE535*, *LE552-LE593*, *LE617-LE665*, *LE679-LE713*, *LE737-LE769*, *LE784-LE816*, *LE829-LE867*, *LE885-LE925*, *LE938-LE966*, *LE979-LE999*, *LF101-LF135*, *LF153-LF184*, *LF197-LF237*, *LF256-*



Installing the Rolls-Royce Merlin XX in a late-series Hurricane IIC.

*LF298*, *LF313-LF346*, *LF359-LF405*, *LF418-LF435*, *LF451-LF482*, *LF494-LF516*, *LF529-LF542*, *LF559-LF601*, *LF620-LF660*, *LF674-LF721*, *LF737-LF774*, *MW335-MW373*, *PG425-PG456*, *PG469-PG499*, *PG512-PG554*, *PG567-PG610*, *PZ730-PZ778*, *PZ791-PZ835*, *PZ848-PZ865*. Deliveries commenced, 29/9/43; completed, 24/5/44. Average rate of production, almost 6 aircraft per day.

No. 6 (F) Sqdn., Canne, 11/44; Mk. IV's with R.P. armament: *LE291* (operating from Vis, attacked German H.Q. at Zegar, Yugoslavia, 18/12/44); *LF482* ("C"); R.P. attack on Risan, Yugoslavia, 21/11/44; *LF498* (R.P. attack on bridge at Spuz, 11/44).

No. 20 (F) Sqdn., Burma, 1944; tropical Mk. IID: *LF113*.

No. 113 (F) Sqdn., Burma, 1944; tropical Mk. IIB fighter-bomber: *LE346* ("F").

No. 247 (F) Sqdn.: *PG739* ("E"); used for communications).

No. 309 (Of Province Ziemia Czerwieska) Sqdn. (Polish), R.A.F.: *LF363* (Mk. IIC; last R.A.F. Hurricane on Charge; see below).

No. 288 Sqdn., Mk. IIC: *LE836* ("W"); used for communications).

No. 289 Sqdn., Mk. IIC's: *LF580* ("W"), *LF626* ("N"), *LF628* ("S"), *LF636* ("Z"), *LF757*.

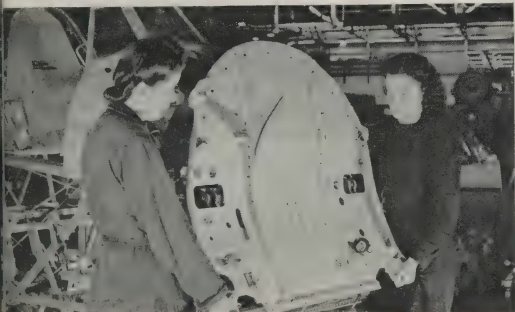
No. 501 Sqdn., A.A.F.: *PG570* (used for communications).

No. 514 (Combined Operations) Sqdn., 1944; Dundonald, Mk. IIC's: *LF428*, *LF514*, *LF534*.

No. 516 (Combined Operations) Sqdn., 1944; Dundonald, Mk. IIC's: *LE999*, *LF133*, *LF160*, *LF163*, *LF180*, *LF207*, *LF534* (hit landing craft at Troon, 18/3/44, during exercises and crashed).

No. 521 (Meteorological Calibration) Sqdn., Langham, 11/44; Met. Mk. IIC's: *PZ803*, *PZ806*, *PZ818-PZ820*.

No. 601 Sqdn., A.A.F., 1945; Mk. IV: *PG440* (used for communications).



Women were employed in large numbers on the Hurricane production lines.

## THE HAWKER HURRICANE

No. 650 Sqn., 3/44; Mk. IV: *LE514*.  
 No. 695 Sqn., 1944: *PG751* ("W").  
 No. 10 Sqn., I.A.F., India and Burma, 10/44; tropical Mk. IV: *LF497*.  
 G.A.T.U., India, 1945; tropical Mk. IIC's: *LE398*, *LE502*, *LE815*, *LF157*, *LF203*; tropical Mk. IV's: *LE646*, *LE993*.  
 No. 41 O.T.U., 5/45; Mk. IIC's: *LF295*, *LF296*, *LF322*, *LF346*, *LF363* (see also under Other Aircraft below), *LF366*, *LF368*, *LF376*, *LF379*, *LF386* (to No. 49 M.U., 7/45), *LF396*, *LF680*, *MW363*, *PG476*.  
 No. 61 O.T.U., 7/45; Mk. IIC's: *LF293* (tropical), *LF366*, *LF376*, *LF379*, *MW366*.  
 Aircraft shipped to Russia, 1944; Mk. IIC fighter-bombers: *LE529*; Mk. IV's: *LF463*, *LF470*, *LF473*, *LF481*, *LF509*, *LF510*, *LF592*, *LF595*, *LF596*.  
 Aircraft sold to Portugal, 1945-46; tropical Mk. IIB fighter-bomber: *LF342*; tropical Mk. IIC fighter-bombers: *LF133*, *LF360*, *LF383*, *LF422*, *LF425*, *LF514*, *LF564*, *LF565*, *LF568*, *LF570*, *LF586*, *LF620*, *LF699*, *LF706*, *LF717*, *LF757*, *LF772*, *MW373*, *PG521*, *PG535*, *PG538*, *PG543*, *PG599*, *PG610*, *PZ735*, *PZ738*, *PZ745*, *PZ759*.  
 Aircraft sold to Eire, 3/45. I.A.C. Nos. in brackets: *LF541* (116), *LF624* (118), *PZ796* (120).  
 Coningsby Stn. Flt., 1944; Mk. IIC's: *LF374*, *LF382*, *LF395*.  
 Waddington Stn. Flt., 1944; Mk. IIC's: *LF404*, *LF421*.  
 Empire Central Flying School, Hullavington, 1944; Mk. IIC's: *PG567*, *PG568*, *PG571*, *PG573*.  
 Ground Instruction Machines (subsequent airframe nos. in brackets where known): *LE747* (5496M), *LF398* (5415M), *LF580* (5402M), *LF627* (with No. 5 S. of T.T.); *LF674* (5418M), *LF680* (with No. 5 S. of T.T.), *LF738* (5405M), *LF745* (5406M), *LF755* (5419M), *MW340* (5463M), *MW341* (5311M), *MW354* (5321M), *PG440* (5462M), *PG541* (5420M), *PG484* (5422M), *PG497* (5417M), *PG498* (5421M), *PG517* (5407M), *PG529* (5408M), *PG546*, *PG570* (5464M), *PG593*, *PG604* (5416M).  
 Other aircraft: *LE353* (Mark IIC; armament later removed and aircraft supplied to No. 231 Communications Flight); *LE525* (to A. & A.E.E. for trials, 11/43); *LE796* (tropical Mk. IIC of D Flight, No. 22 A.A.C.U., 1944); *LE806* (Mk. IIC; force landed during test; delivery delayed until 19/12/43); *LF363* ("F"); Mk. IIC of No. 309 (Polish) Sqn., 2/44; No. 41 O.T.U., 1945; to Waterbeach Stn. Flt., 1950-54; Biggin Hill, 1959. Last Hurricane held on R.A.F. Charge; leader of Battle of Britain commemorative "fly-past"; also used in several films); *LF422* (trials with Merlin 22 engine at Langley, 1/45); *LF632* (Mk. II trainer; guns removed); *PZ865* (purchased by H.A.L. off Contract, named "The Last of the Many") Registered G-AMAU and raced by H.A.L. on many occasions, 1945-60).

**THE HAWKER HURRICANE MARK II (AUSTIN-BUILT).** One production batch of 300 aircraft built by



The last Hurricane, PZ865, at Dunsfold airfield in 1960.

the Austin Motor Co., Ltd., Longbridge, during 1941. *AP516-AP550*, *AP564-AP613*, *AP629-AP648*, *AP670-AP714*, *AP732-AP781*, *AP801-AP825*, *AP849-AP898*, *AP912-AP936*. Excepting *AP516-AP518*, this entire batch was scheduled for supply to Russia during 1941-42, for service with the Russian Navy. Although a large proportion in fact sailed by PQ convoy (many aircraft being lost en route due to enemy action), other aircraft were retained for issue to the Royal Air Force, principally as replacements.  
 No. 208 (AC) Sqn., Western Desert and Habbaniyah, Iraq, 1942; tropical Tac R Mk. IIB's: *AP851*, *AP852*.  
 No. 312 (Czech) Sqn., R.A.F., Kenley, 6/41; offensive sweeps, Mk. IIB's: *AP518*, *AP519*.  
 No. 335 (Hellenic) Sqn., R.A.F., Middle East, 1942-43; *AP656* (tropical Mk. IIB in action over Fuqa and Daba, 10/42); *AP888* (tropical Mk. IIC engaged in shipping protection, Central Mediterranean, 10/43).  
 No. 607 Sqn., A.A.F., Manston, 2/42; Channel sweeps, Mk. IIB: *AP896*.  
 No. 1414 (Meteorological) Flt., Mogadishu and Eastleigh, East Africa, 1943-45; tropical Met. Mk. IIC: *AP920*.  
 Other Aircraft: *AP516* (retained by Austins for performance and handling tests); *AP517* (production performance and handling checks, H.A.L. and A. & A.E.E., 1941).

**THE HAWKER HURRICANE MARK I (CANADIAN-BUILT).** First production batch of 40 aircraft built by the Canadian Car and Foundry Corporation, Canada, during 1939-40. *P5170-P5209*. Rolls-Royce Merlin III engines, D.H.-Hamilton Hydromatic 3-blade propellers and many other proprietary items despatched from the United Kingdom; completed aircraft shipped to Britain during March-August 1940. Some aircraft retained in Canada.

No. 1 (F) Sqn., Wittering, 9/40: *P5187*.  
 No. 43 (F) Sqn., Tangmere, 8/40: *P5191*, *P5196*.  
 No. 111 (F) Sqn., Croydon, 8/40: *P5209*.

No. 249 (F) Sqdn.; in action over Brooklands, 4/9/40: *P5206*.

No. 253 (F) Sqdn.; in action over Brooklands, 4/9/40: *P5172*, *P5179*, *P5181*.

No. 501 Sqdn., A.A.F., 8/40: *P5189* ("M"), *P5193* ("O").

No. 56 O.T.U., Sutton Bridge, 11/40: *P5195*.

Other Aircraft: *P5170* (production check trials at R.A.E., H.A.L. and A. & A.E.E., 3/40-8/40); *P5176* (force landed in Eire, 1942; bought and transferred to I.A.C. as 93); *P5183* (later converted to Sea Hurricane Mk. IA; Merchant Ship Fighter Unit, Speke, 1941); *P5187* (catapult trials, R.A.E., 11/40-3/41).

#### THE HAWKER CANADIAN HURRICANE MARK

X. Second production batch of 340 aircraft built by the Canadian Car and Foundry Corporation, Canada, during 1940-41. *AE958-AE977*, *AF945-AG344*, *AG665-AG684*. Packard-built Rolls-Royce Merlin 28 engines driving 3-blade Hamilton Hydromatic propellers, many without spinners. Approximately the first 100 machines built with eight-gun wings, the remainder with Mk. IIB twelve-gun wings, but many subsequently equipped with four Oerlikon 20-mm. guns. Some aircraft were retained in Canada and served with the R.C.A.F., 1940-42.

No. 1 Sqdn., R.C.A.F. (later No. 401 Sqdn.), Northolt, 8/40-9/40; all with 8-gun wings: *AE960* ("W"), *AE966* ("A"), *AE974* ("C"), *AF990-AF992*, *AG108-AG112*, *AG667* ("L"), *AG670*.



The Canadian Hurricane XII, 5624, fitted with ski under-carriage. (See also Page 169.)



The Irish Hurricane I, (ex-Canadian P5176) re-registered as 93.

No. 1 (F) Sqdn., Hawkinge, 5/41; 12-gun wings: *AG118*, *AG216* ("O"); Tangmere, 1942; intruder with 4-cannon wings: *AG118*.

No. 43 (F) Sqdn., Tangmere, 6/42; anti-shipping strikes; 4-cannon wings: *AF961*, *AG236*.

No. 56 (F) Sqdn., 2/41; 12-gun wings: *AG196*, *AG248* ("B").

No. 182 (F) Sqdn., 1942; 12-gun wings: *AG159* ("O"), *AG232* ("P").

No. 527 (Calibration) Sqdn., Hornchurch, 10/43; armament removed: *AG146*.

No. 607 Sqdn., A.A.F., Manston, 2/42; daylight sweeps; fighter-bomber with 12-gun wings: *AG338*.

No. 680 (PR) Sqdn., Communications Flt., Cyprus, 9/43; tropical aircraft, guns removed: *AG153*.

No. 1432 (Army Co-operation) Flt., tropical aircraft with 8-gun wings: *AG177* (Oshogbo, Nigeria, crashed 12/12/42); *AG276* (Kano, Nigeria, 1942-43).

Other aircraft converted to take 12-gun wings at No. 13 M.U., Henlow: *AG277*, *AG301*, *AG341*, *AG344*, *AG671*, *AG680*.

Aircraft serving with R.C.A.F., Canada (R.C.A.F. nos. in brackets): *AG299* (1378), *AG310* (1379).

No. 55 O.T.U., 1941; 8-gun wings: *AG237*, *AG253*, *A267*.

No. 59 O.T.U., 1941; 8-gun wings: *AG123*, *AG212*, *AG245*.

#### THE HAWKER CANADIAN HURRICANE MARK

X. Third production batch of 149 aircraft built by the Canadian Car and Foundry Corporation, Canada, during 1941. *AM271-AM369*, *BW835-BW884*. Packard-built Merlin 28 engines. Aircraft built with eight Browning gun wings but many later modified with twelve-gun or four-cannon wings. Some aircraft retained in Canada for service with the R.C.A.F.

No. 1 (F) Sqdn., Tangmere, 1942; intruder fighter with 4-cannon wings: *AM280*.

No. 43 (F) Sqdn., Tangmere, 1942; intruder fighters with 4-cannon wings: *AM311* ("X"), *AM315* (took part in Dieppe operation, 19/8/42).

Aircraft converted to take 12-gun wings at No. 13 M.U., Henlow: *AM271*, *AM301*, *AM302*, *AM349*, *AM367*, *BW870*, *BW883*.

Aircraft shipped to Russia, 1/42: *AM367*, *BW835*, *BW851*, *BW878*, *BW879*.

#### THE HAWKER CANADIAN HURRICANE MARK

XI. Fourth production batch of 150 aircraft built by the Canadian Car and Foundry Corporation, Canada, during 1941-42. *BW885-BX134*. Many aircraft later modified to take 12 Browning guns or 4 Oerlikon or Hispano cannon. Some aircraft retained for service with the R.C.A.F. in Canada.

Aircraft converted to take 12-gun wings at No. 13 M.U., Henlow: *BW901*, *BW906*, *BW907*, *BW914*, *BW919*, *BW941*, *BW944*, *BW948*, *BW962*, *BW963*, *BW967*, *BX125*, *BX128*, *BX133*.

Delivered to No. 22 M.U., Silloth, with 4-cannon wings for despatch to Russia, 1942: *BW920*, *BW922*, *BW926*, *BW984*, *BX102*, *BX108-BX111*, *BX119-BX124*.

## THE HAWKER HURRICANE

### THE HAWKER CANADIAN HURRICANE MARK

XII. Fifth production batch of 248 aircraft built by the Canadian Car and Foundry Corporation, Canada, during 1942. *JS219-JS371, JS374-JS420* (with 12-gun wings); *JS421-JS468* (most of these aircraft equipped with 4-cannon wings in the United Kingdom, 1943).

No. 59 O.T.U., 12/43; 12-gun wing: *JS330*.

Delivered to No. 22 M.U., Silloth, and Packing Depot, Sealand, for despatch to Russia; 12-gun wings: *JS220, JS221, JS225, JS227, JS228, JS233, JS240, JS256, JS300, JS391, JS396-JS399, JS405-JS412, JS415, JS419*.

Delivered to No. 13 M.U., Henlow, and Packing Depot, Sealand, for despatch to Russia: *JS219, JS229, JS232, JS235, JS237, JS241, JS257, JS309, JS317*.

### THE HAWKER CANADIAN HURRICANE MARK

XIIA. Sixth production batch of 150 aircraft built by the Canadian Car and Foundry Corporation, Canada, during 1942. Packard-built Rolls-Royce Merlin 29 engines driving 3-blade Hamilton Hydromatic propellers. Most aircraft built initially with 8-gun wings, but some subsequently modified with 12-gun and 4-cannon wings. *PJ660-PJ695, PJ711-PJ758, PJ779-PJ813, PJ842-PJ872*. Most aircraft despatched direct to Russia or to Burma at end of 1943; few sent to the United Kingdom, 1943. Small number was fitted with deck landing equipment for use by the Royal Canadian Navy as the Sea Hurricane Mark XIIIA.

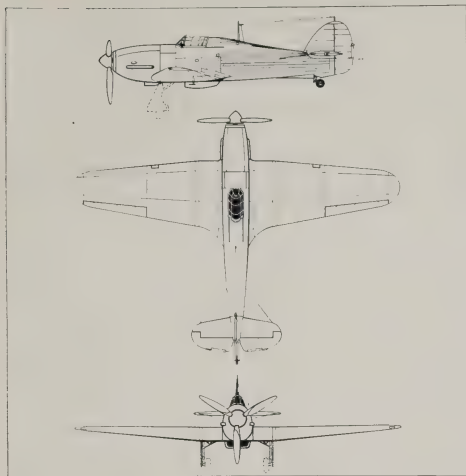
## THE HURRICANE REPAIR ORGANISATION

Having recorded at some length the production and service details of the Hawker Hurricane, some measure of the efforts of the United Kingdom Hurricane Repair Organisation is provided by the accompanying table. The Organisation was based at the Langley Repair Department and the procedure adopted was as follows: The existence of a crashed or damaged Hurricane was notified to the nearest Unit in the complex which, if not already performed by the Service, would inspect

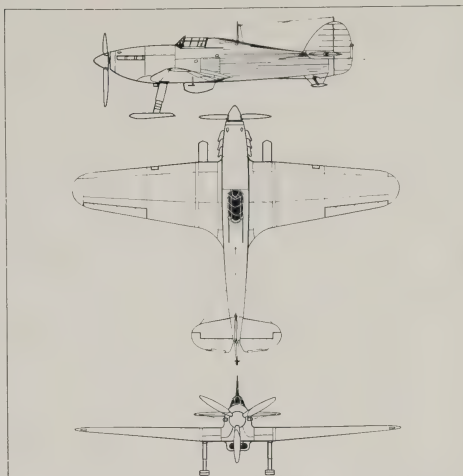
the aircraft and categorize the extent of damage. While the aircraft was removed to the Unit for repair, the damage extent would be notified to Hawker Aircraft Ltd., who would issue the necessary drawings and instructions and any proprietary equipment necessary to make the aircraft fully serviceable again. Repair of the 4,500-odd Hurricanes returned to the Royal Air Force involved the issue of nearly 120,000 drawings in the United Kingdom alone.

<i>Contractor or Unit</i>	1939	1940	1941	1942	1943	1944	1945	<i>Total</i>
Airtraining (Oxford) Ltd. .. ..	—	86	136	130	17	—	—	369
Airwork Ltd., Renfrew .. ..	—	—	1	1	—	—	—	2
Austin Motor Co., Ltd. .. ..	—	13	11	—	—	—	—	24
C.R.U. No. 1, Cowley .. ..	—	128	193	44	—	—	—	365
Cunliffe Owen Aircraft Ltd. .. ..	—	5	2	—	—	—	—	7
David Rosenfield Ltd. .. ..	—	—	—	50	96	34	—	180
De Havillands, Hatfield .. ..	—	138	12	—	—	—	—	150
De Havillands, Witney .. ..	—	—	17	90	116	41	—	264
Gloster Aircraft Co. (Works) .. ..	—	15	23	1	—	—	—	39
Gloster Aircraft Co. (Site) .. ..	—	—	1	—	—	—	—	1
Hawker Aircraft Ltd. (Works) .. ..	—	55	106	8	—	—	—	169
Hawker Aircraft Ltd. (Site) .. ..	5	70	381	276	7	—	—	739
Helliwells Ltd., Walsall .. ..	—	—	26	28	—	—	—	54
Henlow, No. 13 M.U. .. ..	—	272	254	205	9	—	—	740
Morrison Engineering Ltd. .. ..	—	—	—	20	62	97	37	216
Reid and Sigrist (Site) .. ..	—	1	—	—	—	—	—	1
Rollasons, Hanworth .. ..	—	38	55	87	82	2	—	264
Rolls-Royce Ltd. .. ..	—	147	118	—	—	—	—	265
Sealand, No. 30 M.U. .. ..	—	—	2	—	—	—	—	2
Scottish Aviation Ltd. (Works) .. ..	—	4	13	—	—	—	—	17
Scottish Aviation Ltd. (Site) .. ..	—	1	15	—	—	—	—	16
Short Bros., Ltd. (Works) .. ..	—	—	10	9	2	—	—	21
Short Bros., Ltd. (Site) .. ..	—	—	3	3	—	—	—	6
Taylorcraft Ltd., Rearsby .. ..	—	—	64	175	107	—	—	346
43 Group Salvage Units .. ..	—	—	—	43	111	107	19	280
ANNUAL TOTALS .. ..	5	973	1,443	1,170	609	281	56	4,537

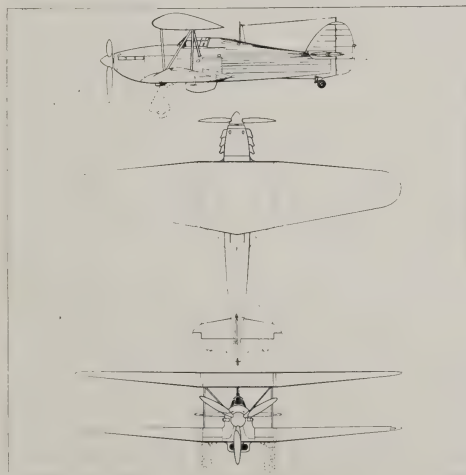
## APPENDIX A : "ONE-OFF" HURRICANE EXPERIMENTS



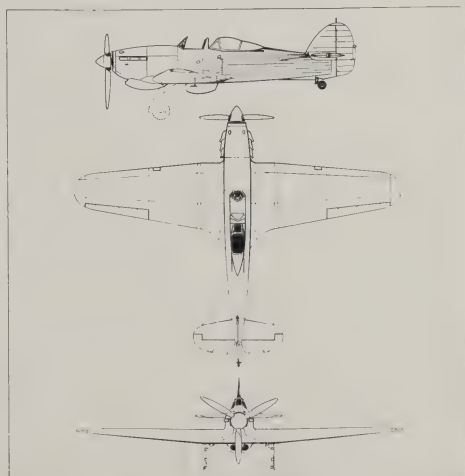
*The Yugoslav Hurricane with Daimler-Benz DB601A.  
(See page 41.)*



*The Canadian Hurricane with fixed ski undercarriage.  
(See page 167.)*

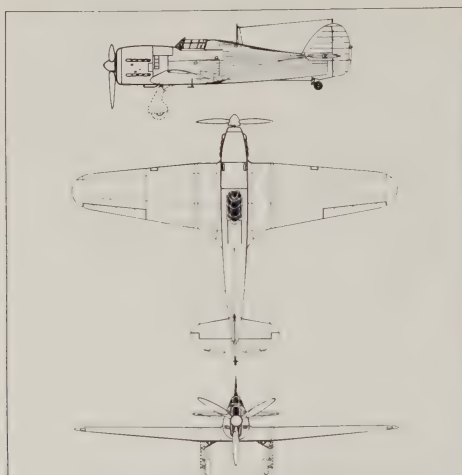


*The Hillson FH.40 Hurricane Slip-wing aircraft.  
(See page 102.)*

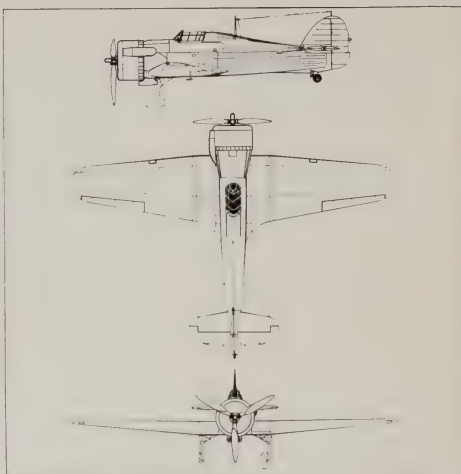


*The Persian Hurricane Two-Seat Trainer. (See page 137.)*

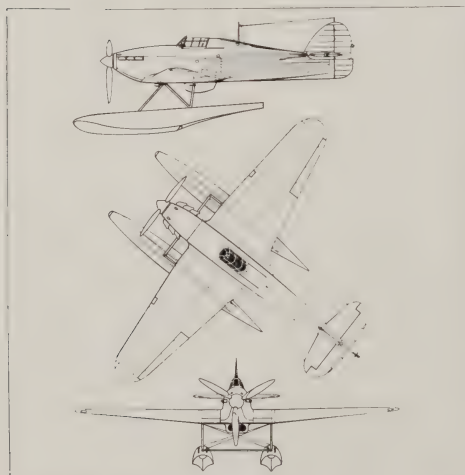
## APPENDIX B: UNCOMPLETED HURRICANE PROJECTS



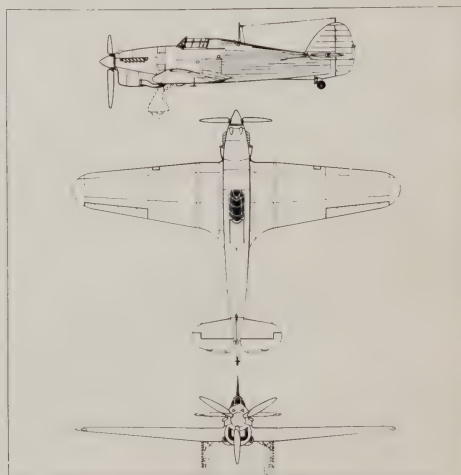
*Hurricane project with Napier Dagger engine.*



*Hurricane project with Bristol Hercules engine.*



*Hurricane with twin-float undercarriage (conversion commenced but not completed).*



*Hurricane project with Rolls-Royce Griffon engine.*

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